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No. 11



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BIOCHEMISTRY

UDC 615.324:593/.594

BIOLOGICALLY ACTIVE SUBSTANCES OBTAINED FROM HYDROBIONTS OF USSR TERRITORIAL WATERS OF INTEREST TO PHARMACY

Moscow FARMATSIYA in Russian Vol 30, No 3, May-Jun 81
(manuscript received 26 Feb 80) pp 26-34

AZHGIKHIN, I. S., GANDEL', V. G., ARAZASHVILI, A. I., ZAMUREYENKO, V. A. and MEKHTIKHANOV, S. D., All-Union Scientific Research Institute of Marine Fisheries and Oceanography, Moscow

[Abstract] The most widely distributed species of hydrobionts characterized by large biomass inhabiting the coastal waters of the Caspian and Barents Seas, the Sea of Okhotsk and the Sea of Japan were investigated to determine their possible application in pharmacy. Chemical analysis of 55 species of nonindustrial hydrobionts revealed lipid fractions from low-value fish from the Caspian Sea, polysaccharides from Caspian algae and various oncologically active substances from invertebrates of the Barents Sea and Sea of Japan to be of greatest interest in pharmacological practice. The fatty acid composition of lipids from non-commercial Caspian fish was determined by mass spectrometry and chromatosectrometry. References 1 (Russian).
[260-6521]

UDC 616.98:578.833.27]-092.9-07:[616.155.32-097.5:616.411-018.1

DEMONSTRATION IN VIVO OF ANTIBODY-DEPENDENT PROTECTIVE EFFECT OF MOUSE NONIMMUNE SPLENOCYTES IN EXPERIMENTAL INFECTION OF MICE WITH LUNGAT OR TICK-BORNE ENCEPHALITIS

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 81
(manuscript received 10 Jan 81) pp 33-36

SEMENOV, B. F. and KHOZINSKIY, V. V., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] The antibody-dependent protective function of nonimmune splenocytes in mice infected with lungat virus or tick-borne encephalitis was investigated.

A combination of specific viral antibodies and splenocytes from noninfected mice was administered to animals with suppressed immunity and infected with tick-borne encephalitis or lungat virus. Animals that received the virus along with specific antibodies showed an increased average life and survival rates compared to animals that received only antibodies. The antibody dose determined the protective effect. T-lymphocyte activity had no bearing on the capacity of splenocytes to intensify the protective action of antibodies; cells producing antibody-dependent cytotoxicity provided protective action to infection with lungat virus rather than the antibody itself or specifically sensitized T-lymphocytes. The T-lymphocytes and antibodies provided a protective effect when the virus was administered peripherally. Figures 1; references 14: 3 Russian, 11 Western. [259-6521]

UDC 577.153

PROPERTIES OF VIPER VENOM PHOSPHODIESTERASE IMMOBILIZED ON AGAROSE

Moscow BIOKHIMIYA in Russian Vol 46, No 7, Jul 81
(manuscript received 14 Jul 80) pp 1277-1282

ZAGREBEL'NYY, S. N. and ORESHKOVA, S. F., Special Design and Technological Bureau of Biologically Active Substances, Novosibirsk

[Abstract] Comparative studies were carried out on the properties of native and immobilized phosphodiesterase (EC 3.1.4.1) isolated from the venom of the Central Asian viper (*Vipera lebetina*). Immobilization was achieved by means of coupling to diazotized benzidine agarose. Tests conducted with a number of substrates demonstrated that the immobilized enzyme retained 60-90% of the activity of the native protein and possessed greater thermal tolerance at 50-70°C in the presence or absence of a substrate. There were no significant differences in maximum velocities between the two forms; furthermore, K_m for the immobilized enzyme was twice as great as that of the native enzyme in hydrolyzing p-nitrophenylthymidilate, but differed little in hydrolysis of deoxyoligonucleotides. Energies of activation for both forms were in the 11.7-13.1 kcal/mole range at 30-60°, but dropped to 5-6 kcal/mole for the immobilized enzyme when hydrolyzing p-nitrophenylthymidilate or deoxyoligonucleotides at 15-30°C. At the latter temperature range, hydrolysis of the deoxyoligonucleotides by the native enzyme was characterized by an energy of activation of 12.1 kcal/mole. Figures 4; references 13: 5 Western, 8 Russian. [318-12172]

PEPTIDE MAPPING OF HUMAN TYPE 6 AND SIMIAN TYPE 7 ADENOVIRAL HEXONE AND CORE PROTEIN

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 91, No 3, Mar 81 (manuscript received 16 May 80) pp 313-315

KHROMOV, I. S., KARAMOV, E. V. and ZOLOTARSKAYA, E. Ye., Laboratory of Biochemistry, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow, presented by V. M. Zhdanov, academician of the USSR Academy of Medical Sciences

[Abstract] Tryptic mapping of proteins (fingerprint) was used to determine the resemblance between human (type 6) and simian (type 7) adenoviruses of the two main proteins, internal ["core"] and external. Ad6 was obtained from HeLa cell culture and SA7 from a green marmoset kidney cell culture. Techniques for extraction of viruses, purification, destruction of virions, separation of proteins, iodination of the latter are described in other works. Chemotrypsin-free trypsin (25 mg) was added to pieces of gel containing radioisotope-labeled protein and dried, then incubated. After removal of gel and lyophilization, electrophoresis was performed in a pyridine-acetic acid-water system combined with chromatography in a system of pyridine-n-butanol-acetic acid and water, using Kodak film for autoradiography. There was some similarity of Ad6 and SA7 proteins, more marked in the main core protein than hexone. The trypsin technique is more sensitive and accurate than gel-phoresis of whole proteins and can be useful in classifying adenoviruses according to assortment of structural proteins, as well as demonstration of antigenic determinants, investigation of correlation, evolution and origin of different forms thereof. Figures 2; references 12: 2 Russian, 10 Western.
[273-10,657]

UDC 576.8.095.5:576.851.45:620.187

ULTRASTRUCTURAL CHARACTERISTICS OF L FORM FORMATION IN PLAGUE BACILLUS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 6, Jun 81
(manuscript received 21 Jul 80) pp 78-83

SAYAMOV, S. R., KURILOV, V. Ya., DUNAYEV, G. S., KOSTYUKOVSKIY, V. M., ZYKIN, L. F., PROZOROVSKIY, S. V. and SOROKIN, V. M., Volgograd Scientific Research Antiplague Institute, and the Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences

[Abstract] Ultrastructural investigations were conducted on L phase induction in the plague bacillus grown on media containing progressively increasing concentrations of penicillin. The data revealed that L transformation in this case

followed the pattern established for other Gram-negative bacteria. Beginning with the initial passage, features such as large body formation, multiplication by division, vesiculation, formation of elementary bodies, and the presence of circular membranous structures could be distinguished. The L forms rapidly revert to the original form even after 22 subcultures. Comparison with spheroplasts obtained by lysozyme induction underlined the significance of the elementary bodies in the reproduction of plague L forms. Figures 2; references 14: 5 Western, 9 Russian.

[314-12172]

UDC 577.1

SYNTHESIS OF DOUBLE STRANDED RNA IN ISOLATED MICROSOMES OF CHICKEN CELLS
INFECTED WITH ROUS SARCOMA VIRUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 259, No 4, 1981
(manuscript received 12 Feb 81) pp 996-999

YAKOVLEV, V. N. and PEREVOZCHIKOV, A. P., Scientific Research Institute of
Oncology imeni N. N. Petrov, Leningrad

[Abstract] Investigations on in vitro microsomal RNA synthesis in a system of chicken fibroblasts infected with Rous sarcoma virus showed production of equivalent amounts of double stranded (ds) RNA at permissive and nonpermissive temperatures. Since the dsRNA was not produced by RNA-polymerase derived from uninfected cells or lysates of viral particles, it appears that synthesis of the 10-12S and 4S dsRNA was dependent on viral reproduction but not necessarily transformation. It is evident, however, that both viral and host enzyme systems participate in its synthesis. Figures 1; references 10: 3 Russian, 7 Western.
[334-12172]

UDC 615.9.07:612.833.81

MULTIFACTORIAL CORRELATION ANALYSIS IN EVALUATING ANIMAL BEHAVIOR IN EXPERIMENTAL
TOXICOLOGY

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 81
(manuscript received 16 Nov 79) pp 14-16

BURKATSKAYA, Ye. N., professor, and VITER, V. F., candidate of medical
sciences, Kiev Scientific Research Institute of Industrial Hygiene and
Occupational Diseases

[Abstract] Multifactorial regression analysis was performed on certain
behavioral correlates of outbred white rats exposed to sevin (carbaril) for

various periods of time under experimental conditions. Evaluation of the data obtained on conditioned reflexes, spontaneous motor activity, and summation of threshold impulses in the CNS suggested that the safest method of application of this agricultural pesticide consists of a scheme calling for one week of application at two week intervals. The study also underlined the advantages of computerized mathematical analysis in experimental toxicology. Figures 1; references 10: 3 Western, 7 Russian.

[338-12172]

UDC: 595.122

BEHAVIOR OF PHILOPHTHALMUS RHIONICA MIRACIDIA UNDER COMBINED EFFECT OF PHOTIC AND CHEMICAL STIMULUS

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: BIOLOGIYA in Russian No 9, Issue 2, May 81 (manuscript received 20 Dec 79) pp 9-16

SEMENOV, O. Yu.

[Abstract] A study was made of reactions of *P. rhionica* miracidia to the combined effect of photic and chemical stimuli, and data were summarized on the role of chemical factors in miracidial behavior. The technique of chemical mollusk models (CM) was used in the form of CM, contact CM and SCW-CM [snail-conditioned water], based on solutions of different chemicals and activated carbon. Prescott medium was used in all tests, each experiment repeated at least 5 times. Finely ground carbon was put into a salt shaker with Prescott medium and miracidia applied to the side of the shaker, light sources being placed on either side of it, opposite one another, turning on one of the lights alternately: opposite the larvae in the case of "+" variants of miracidia and the nearest one with "-" specimens, to force them to move toward the mound of carbon, then both lights were turned off and reactions examined under a binocular microscope with a light from the top. Pure carbon was used in control experiments. Plus or minus refers to phototaxis properties. Aerial photographic film was used to record trajectories of miracidia, 80-100 routes per experimental group. Miracidia moved more slowly in SCW medium than in pure Prescott medium. Final stages of miracidia prior to larvae are entirely controlled by chemical stimuli indicating that substances emitted by mollusks can attract them. CM elicited a more marked reaction than SCW-CM. The demonstrated change from positive to negative phototaxis under the influence of chemicals excreted by the *M. praemorsa* mollusk in nature apparently consists of migration of larvae to the near shaded region, such as the shell-covered part of the mollusk's body, which could hinder the invasive process of *P. rhionica*. Figures 1; references 28: 8 Russian, 20 Western.

[266-10,657]

**DYNAMICS OF CONCENTRATION OF PROTEIN-BOUND AND FREE FORMS OF
11-HYDROXYCORTICOSTEROIDS IN BLOOD OF WILD DOMESTIC MICE AS FUNCTION OF
BASIC PROPERTIES OF NERVE PROCESSES AT DIFFERENT PHASES OF ESTABLISHING
HIERARCHICAL STRUCTURE OF MODEL POPULATIONS**

Sverdlovsk EKOLOGIYA in Russian No 5, Sep-Oct 80
(manuscript received 18 Jul 79) pp 68-76

SHILOV, I. A. and KAMENOV, D. A., Moscow State University imeni M. V. Lomonosov
and Institute of Evolutionary Morphology and Animal Ecology imeni A. N. Severtsov,
USSR Academy of Sciences

[Abstract] The dependence in the level of concentration of individual forms of 11-hydroxycorticosteroids on the degree of qualities of animals was determined by the intensity and mobility of main processes of the nervous system during establishment and maintenance of the hierarchical structure of model populations of wild domestic mice. The individual characteristics of mobility and the intensity of nerve processes and the number of protein-bound and free forms of 11-hydroxycorticosteroids in the blood were investigated in solitary animals and in the group as a whole. The concentration of protein-bound hydroxycorticosteroids that determine the mobilization of endocrine mechanisms was higher when the processes of the nervous system were more intense and mobile. The level of biologically active 11-hydroxycorticosteroids indicates a stress situation among the animals. Conditioned reflex adaptive responses more typical for animals with a strong type of nervous system and endocrine responses that are less economical and typical for weak type animals were determined during exposure to stress factors. Females are under the control of the population structure even though they do not participate directly in the hierarchical structure of the population. References 33: 23 Russian, 10 Western.
[293-6521]

EXPERIMENTAL ECOLOGY OF VOLES

Sverdlovsk EKOLOGIYA in Russian No 5, Sep-Oct 80 pp 108-110

BASHENINA, N. V., Moscow State University imeni M. V. Lomonosov

[Abstract] This describes material contained in the monograph [Experimental Ecology] by A. V. Pokrovskiy and V. N. Bol'shakov, "Nauka", Moscow 1979. An experimental situation was set up to determine the ecology of voles and natural hybridization among different species. Problems of seasonal cyclicity were studied, comparative interpopulation investigations were carried out and debatable questions of taxonomy by hybridization were determined in development of experimental ecology. Selection of the initial materials for experimentation has presented the main difficulty. Extrapolation of data from investigation of seasonal

cyclicality to real situations presents a difficult proposition. Extensive materials are required for study of natural populations and careful field experiments are necessary to determine the correct ecological structure of various species of voles.

[293-6521]

UDC 595.70:591.51

PARALLEL STUDY OF ECOLOGY AND BEHAVIOR OF INSECTS IN THE FIELD AND IN THE LABORATORY: REPORT 1

Leningrad ENTOMOLOGICHESKOYE OBOZRENIYE in Russian Vol 60, No 1, Jan-Mar 81 pp 77-91

STEBAYEV, I. V., Novosibirsk State University

[Abstract] Field recording-experimental methods of studying the behavior of population groups and individual specimens of insects were investigated during micromigration, feeding and mating. Populations of Odonata, Acridoidea, Formicidae and Collembola were studied as model groups that inhabit the air, vegetation and soil. The general features of data collecting methods in the field and in the laboratory are described. The data are used in solving problems of population, evolutionary and ecosystem ecology. Figures 3; references 70: 65 Russian, 2 Polish, 3 Western.

[295-6521]

UDC 576.895.42

PRESENCE OF SEX PHEROMONE IN IXODID TICK HYALOMMA ASIATICUM (IXODIDAE)

Leningrad PARAZITOLOGIYA in Russian Vol 15, No 2, Mar-Apr 81 pp 150-156

LEONOVICH, S. A., Zoological Institute, USSR Academy of Sciences, Leningrad

[Abstract] Pheromone relationships were studied in various behavioral experiments on the ixodid tick *Hyalomma asiaticum*. Olfactory investigations reveal a volatile substance produced by fed females of the tick species that is identified as a sex pheromone. The pheromone is produced after feeding females reach a weight of 0.07 grams. Hungry males do not produce pheromones and are not attracted to fed female pheromones. Males are not attracted to females if the external openings of the foveal glands are plugged with wax. The sex pheromone is apparently secreted through the foveal glands of ticks. Two types of pheromone participation in the behavior of *Amblyomma* ticks are indicated, with ixodid ticks of *Hyalomma asiaticum* belonging to the first type. In this type of behavior, the female indicates readiness to mate only after both male and female have fed on the host animal. Figures 1; references 18: 3 Russian, 15 Western.

[294-6521]

IN VIVO RESTRICTION OF ESCHERICHIA COLI TRANSFORMING DNA BY R·M·EcoRI
ENDONUCLEASE

Moscow GENETIKA in Russian Vol 17, No 7, Jul 81

(manuscript received 20 Mar 80, after revision 14 Jul 80) pp 1205-1209

ALESHKIN, G. I., TIMAKOVA, N. V., DITYATKIN, S. Ya., IL'YASHENKO, B. N. and
SKAVRONSKAYA, A. G., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya,
USSR Academy of Medical Sciences, Moscow

[Abstract] Conditions are described for studying transformation in an *E. coli* system, employing *E. coli* HfrC as DNA donor and *E. coli* K-12 strains as recipients. Control data for transformation were obtained with *E. coli* JC7623 carrying mutations *recBC sbcB* which favor transformation, while experimental data were provided by transformation of *E. coli* AB1157 (pSA14) and AB1157 (pSA25) which are wild types in terms of genes *recBC+* *sbcB+*. The plasmid pSA14 codes for the restriction enzyme EcoRI, while the plasmid pSA14 is devoid of the restrictase genes. The resultant data showed that the formation of transformed cells with AB1157 as recipient was 7 to 10 fold lower than with JC7623, suggesting that *recBC sbcB* mutations only increase the yield of transformed cells but do not determine competence per se. Furthermore, there was a direct correlation between the in vitro treatment of DNA with EcoRI and the results obtained in vivo with AB1157, demonstrating that recipients with pSA14 and pSA25 plasmids may be employed for preliminary in vivo screening of *E. coli* chromosomal markers for susceptibility to inactivation by the EcoRI restrictase. References 11: 2 Russian, 9 Western.
[307-12172]

ENVIRONMENT

UDC 614.71/.73

ESTABLISHING HYGIENIC STANDARDS FOR AIR POLLUTION

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 6, Jun 81
(manuscript received 1 Nov 80) pp 17-20

GRIGOREVSKAYA, Z. P., KOSYAKOV, V. V., OSTAPOVICH, I. K. and
PECHENNIKOVA, Ye. V., Institute of General and Communal Hygiene
Imeni A. N. Sysin, USSR Academy of Medical Sciences, Moscow

[Abstract] The nature of the effect of chemical substances on the body was investigated as a function of concentrations and the length of their effect. A method that permits one to establish time-differentiated maximum permissible concentrations of atmospheric pollutants with regard to intermittent action on the body was developed on the basis of studying the concentration-time dependence. The method was used experimentally to study the biological effect of substances related both to electrolytes and nonelectrolytes. The threshold concentrations for sulphur dioxide, ozone, formaldehyde and benzene were established by extrapolating the concentration-time curves prior to the chronic experiment.

References 8: 7 Russian, 1 Western.

[301-6521]

MEDICAL DEMOGRAPHY

UDC 614.2.007(470)

STATISTICAL MATERIAL ON DEVELOPMENT OF HEALTH-CARE NETWORK AND DYNAMICS OF MEDICAL PERSONNEL IN RSFSR HEALTH-CARE ESTABLISHMENTS

Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 12, Dec 80 (manuscript received 17 Apr 80) pp 30-33

[Article by V.N. Ivakina, candidate of medical sciences, chief of the department of medical statistics at the RSFSR Ministry of Health]

[Text] In accordance with the plan for the development of public health in the RSFSR, during 1979 there was further growth in the number of hospital beds available and in the provision of physicians and middle-level medical personnel for therapeutic and prophylactic establishments.

During the first 4 years of the 10th Five-Year Plan the number of beds available in establishments subordinate to the RSFSR Ministry of Health increased by 116,200. Provision of hospital beds for the population increased from 122.5 to 128.1 per 10,000. The number of physicians available increased from 34.8 to 38.9 per 10,000.

Indicators for the development of public health in the RSFSR are shown in Table 1.

Table 1. Main Indicators for the Development of Public Health in the RSFSR (all figures in thousands) (all departments)

<u>Indicator</u>	<u>1970</u>	<u>1975</u>	<u>1977</u>	<u>1978</u>
Total number of physicians (including dentists)	378.4	468.9	505.5	523.7
Number of middle-level medical personnel	1212.3	1416.5	1482.2	1502.8
Number of hospitals	13.8	13.1	12.9	12.6
Number of hospital beds	1469.3	1649.2	1714.0	1744.0
Number of outpatient-polyclinic establishments	19.9	18.9	18.9	18.6
Number of doctor's assistants and midwifery stations, health stations and others	52.1	51.0	50.7	50.1
Number of gynecological and pediatric consultation clinics, polyclinics and outpatient departments (independent and as part of other establishments)	11.5	12.1	12.1	12.2

Table.2 Distribution of Beds and Numbers of Hospitalized Patients by Individual Types of Medical Establishments (Health-Care System) in the RSFSR

Type of establishment	Number of hospital beds (000's)					Number of hospitalized patients (000's)				
	1970	1975	1977	1978		1970	1975	1977	1978	
Oblast, kray, republic hospitals	52.4	61.7	63.9	65.6		835.0	984.3	1051.7	1085.8	
Oblast pediatric hospitals	4.2	8.9	10.3	10.2		48.6	112.3	149.4	158.9	
City hospitals	410.8	456.0	469.8	474.9		9333.2	10221.9	10391.5	10419.7	
Hospitals for war invalids	10.4	9.9	9.9	9.6		88.9	80.1	86.3	88.9	
Specialized hospitals	136.6	161.2	171.4	172.2		2215.0	2633.6	2774.8	2765.8	
Rayon hospitals with a rayon center in a city	202.6	257.0	278.0	290.0		5020.6	6197.7	6565.2	6743.6	
Maternity homes	45.5	48.0	47.8	48.5		1856.5	1928.5	1956.1	1950.2	
Clinics at higher training establishments and hospitals at scientific research institutes	32.8	35.3	36.7	37.2		364.8	419.7	443.5	457.1	
Psychoneurological hospitals	143.4	162.4	168.1	172.7		463.2	636.0	688.9	709.9	
Dispensaries (urban and rural)	94.8	105.3	114.5	117.9		677.5	783.6	856.5	891.1	
Rural hospitals (all types)	269.8	272.7	269.7	269.5		6498.4	6150.0	6054.6	5957.2	
Other establishments	1.4	0.8	0.7	0.7		6.8	0.2	0.2	0.1	
Totals	1404.7	1579.2	1640.8	1669.1		27408.5	30148.0	31018.7	31228.3	

Table 3. Average Number of Beds per Medical Establishment

<u>Type of establishment</u>	<u>1970</u>			<u>1975</u>			<u>1978</u>		
	Number of establishments	Number of beds	Average number of beds per establishment	Number of establishments	Number of beds	Average number of beds per establishment	Number of establishments	Number of beds	Average number of beds per establishment
Oblast hospitals	87	52425	603	83	61715	744	83	65642	791
Central rayon hospitals									
with rayon center in a city	994	190002	191	1089	243330	223	1123	277666	247
City hospitals	2484	410818	165	2393	455984	190	2348	473038	201
Psychoneurological hospitals	247	143448	581	271	162390	599	274	172680	630
Central rayon hospitals									
with rayon center in the countryside	653	70865	109	622	79529	127	623	87428	140

The distribution of the beds available and the numbers of medical establishments and hospitals by medical discipline are of considerable interest (see Table 2)

It can be seen from Table 2 that the greatest growth rates in the numbers of beds available during the period 1970-1978 was noted in rayon hospitals with the rayon center in a city (from 202,600 to 290,000), city hospitals (from 410,800 to 474,900) and dispensaries (from 94,800 to 117,900). The same situation could be seen in the ratios of hospitalized patients. The growth in the number of patients hospitalized in rayon hospitals with the rayon center in a city during this period was from 5,020,600 to 6,743,600; from 9,333,200 to 10,419,700 in city hospitals; and from 677,500 to 891,100 in dispensaries.

In terms of the proportion of beds available, first place is rightly occupied by city hospitals (28.5 percent), followed in second place by rural hospitals with the rayon center in a city (17.4 percent), third rural hospitals (16.1 percent), fourth and fifth specialized and psychoneurological hospitals (each with 10.3 percent) and sixth, dispensaries (7.1 percent).

Along with the growth in the network of beds available in therapeutic and prophylactic establishments, there was further progress in increasing the capacities of both city hospitals and rayon urban hospitals with the rayon center in a city or in the countryside.

Thus, as at 1 January 1979 the number of city hospitals with 200 or more beds had risen from 779 (1975) to 808.

The increased capacities of rayon hospitals with the center in a city were even more noticeable, with the number of hospitals with more than 400 beds growing from 98 in 1975 to 146 in 1979. The capacities of the central rayon hospitals with the center in the countryside also grew considerably during this period. The number of hospitals with 150 beds increased from 143 to 200. An increase was also observed in the average capacity per establishment (see Table 3).

The increase in the numbers of beds available in medical hospital establishments made it possible to increase considerably the numbers of hospitalized patients (see Table 4).

Table 4. The Level of Hospitalization for Urban and Rural Populations in the RSFSR (per 1,000 of the population)

Year	Hospitalization of population		
	Urban	Rural	Total
1970	206	217	210
1975	214	246	225
1978	215	256	228

It can be seen from Table 4 that the level of hospitalization for the rural population is considerably outstripping that for the urban population. This is a regular phenomenon and is explained by the fact that considerable numbers of the rural population are hospitalized to receive highly specialized medical care in urban therapeutic and prophylactic establishments.

Outpatient polyclinic medical care for the population is being provided by a large network of associated and nonassociated polyclinics, as can be seen from Table 5

Table 5. The Network of Outpatient Polyclinics in the RSFSR (Health-Care System)

Type of establishment	1970	1975	1978
Outpatient polyclinics	18417	17425	17260
City outpatient polyclinics	10840	10337	10298
polyclinic departments in:			
oblast hospitals	96	87	85
city hospitals	2812	2669	2620
rayon hospitals with the center in a city	1338	1377	1358
Pediatric noninfectious-disease hospitals	501	493	484
Maternity homes	383	348	335
Dispensaries	1527	1482	1520
Other hospitals	303	356	470
Nonassociated outpatient clinics	1413	1526	1601
Medical health stations	2011	1433	1216
Independent dental establishments	456	566	609
Outpatient polyclinics in rural areas	7577	7088	6962
Polyclinic departments in rayon hospitals			
with the center in the countryside	1104	954	915
sector hospitals	5652	5112	4800
dispensaries	137	54	49
other hospitals	32	47	24
nonassociated establishments	652	921	1174

It can be seen from Table 5 that the number of outpatient polyclinics in cities and rural areas is dropping with each passing year. The reduction in the number of polyclinics in urban settlements has been less and is connected mainly with the reorganization of small outpatient sections that are branches of polyclinics.

The reduction in the number of rural outpatient polyclinics, especially, sector hospitals, has been considerably greater.

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**HUMAN POPULATION GENETICS IN NORTHERN EUROPEAN PART OF RSFSR, REPORT V:
ESTIMATING REPRODUCTIVE POPULATION BY COMPUTER MODELING OF MARRIAGES AND
MIGRATION PATTERNS**

Moscow GENETIKA in Russian Vol 17, No 7, Jul 81
(manuscript received 26 Jul 79, after revision 3 Mar 81) pp 1299-1303

REVAZOV, A. A., LAVROVSKIY, V. A., TARLYCHEVA, L. V. and KAZACHENKO, B. N.,
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[Abstract] Computer modeling of marriage practices in the Pinezhskiy Rayon of the Arkhangelsk Oblast, based in part on previous genetic and demographic studies, made it possible to compare numbers of actual marriages with computer projected 'marriages' using random number generation based on calculated kinship coefficients. The resultant findings showed a concordance between numbers of actual marriages and computer projected marriages because of avoidance of first and second cousin marriages leading, in effect, to a two-fold increase in reproductive population. However, agreement may have been due to lack of geneologic information on more distant relationships, going back four to five generations. Figures 2; references: 3 Russian.
[307-12172]

UDC 616.127-005.4-02: 616-056.14-085.851

**USING PSYCHOLOGICAL METHODS TO ALTER BEHAVIOR THAT INCREASES RISK OF DEVELOPING
ISCHEMIC HEART DISEASE**

Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 53, No 1, Jan 81
(manuscript received 11 Jul 80) pp 46-48

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[Abstract] A study of participation in group sessions aimed at altering the psychological behavior of individuals at risk for cerebral stroke and myocardial

infarction was conducted. Subjects were 125 men, aged 40 to 59, reporting for health checkups; none had elevated arterial pressure or were obese. Subjects' educational background varied from elementary to advanced; 37.87% smoked, 11.65% were not physically active. Average values for other risk factors were: systolic pressure 126.34 ± 1.29 mmHg, diastolic 81.84 ± 9.82 mmHg, body weight 80.70 ± 10.35 kg, blood cholesterol 226.06 ± 3.97 mg%, blood glucose 131.97 ± 5.69 mg%. The first of four group sessions was attended by 67 subjects (53.6 percent); 40 were present at the second session, and 29 at the third; 25 subjects attended all four sessions. Analysis of attendance and risk improvements (learning to relax, reducing smoking and alcohol intake) resulting from attendance showed that type A individuals with less adaptive behavior and less favorable somatic signs were less inclined to participate in health-improving activity. Physical checks on those attending sessions showed somatic improvement in 44%. It is concluded that convincing individuals to participate regularly in sessions aimed at altering psychological attitudes is one of the main problems in the psychological aspect of preventing ischemic heart disease. Figures 1; references 5: 3 Russian, 2 Western. [325-9642]

UDC 614.88(470-25)

LEVEL AND STRUCTURE OF REQUESTS OF MOSCOW POPULATION FOR MEDICAL FIRST AID

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 6, Jun 81
(manuscript received 11 Sep 80) pp 28-31

KOMAROV, B. D., ISAKHANOV, P. I., KUSTOVA, Ye. A., ARBAKOV, A. I.,
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Moscow Scientific Research Institute of First Aid imeni N. V. Sklifosovskiy

[Abstract] A survey based on a 10-percent selection was conducted of requests of the Moscow population for medical first aid over the period of a full calendar year. The information was gathered by having the mobile teams of the Moscow First Aid and Emergency Medical Aid Station fill out a specially designed card for first aid calls. The cards were subsequently processed on a computer at the information-computer center of the Main Moscow Health Administration. The overall level of requests for assistance without transportation was 237.98 requests per 1000 population, including 192.04 males and 278.2 females. Requests for aid in apartment buildings comprised 83.4 percent of the total number of calls. A total of 4.69 percent of requests were made at work sites, 4.19 percent were made on the street, 2.83 percent were made in medical institutions and 2.05 percent were made in public places. Heart ailments generated the greatest number of calls, totalling 44.8 percent of the total requests. Respiratory complaints comprised the second highest number of requests, followed by accidents, poisonings and injuries in third place. The data are used in solving organizational and planning-normal problems of the medical first aid service in Moscow. It was recommended that the number of cardiological teams be increased and that the level of knowledge in this area of emergency first aid be raised due to the greater number of calls to apartment buildings for heart-related complaints. References 4 (Russian). [302-6521]

CALCULATING HEALTH-RELATED CAPITAL

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 81
(manuscript received 26 Jun 80) pp 20-26

KORCHAGIN, V. P.

[Abstract] The category of "health-related capital" ["economic stock of health"], (HRC) which refers to total cost of medical care over a lifetime, generations and the entire population of the country, is one aspect of public health problems which considers HRC as production of "fixed capital." Formulas are offered to calculate the equivalent unit of medical care for different age groups per year, reflecting use of medical services. The cost per unit medical service has increased from 1.52 rubles in 1900-1913, 6.20 in 1938, 35.61 in 1968 to 53.54 rubles in 1978. The structure of HRC has also been broken down according to population of employable age, child and senior citizen population. Relative medical care requirements are tabulated for different years; HRC is listed as a function of employment; cumulative use of medical services is also tabulated. The concept and calculation of HRC as applied to economic analysis demonstrates new aspects of the process of social reproduction, objective factors involved and intensified by the scientific and technological revolution, and permits evaluation of the public health service's contribution to social production. Tables 8.
[271-10,657]

MAIN FEATURES OF MEDICODEMOGRAPHIC PROCESSES IN USSR AND ABROAD

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 81
(manuscript received 3 Oct 80) pp 11-16

OVCHAROV, V. K. and BYSTROVA, V. A., All-Union Scientific Research Institute of Social Hygiene and Public Health Organization imeni N. A. Semashko, Moscow

[Abstract] It is important to analyze all aspects of economic and demographic consequences of population movement [regeneration] to make optimum use of manpower resources, industry and to locate the population over the country's territory. Medico-demographic processes have unique features related to the scientific and technological revolution, its effect on health, so that more studies are being made of the environment, life style and behavior of different population groups. Statistics are given on the following indicators: birth rate, death rate and causes of death in different groups, aging of the population, difference between death rates referable to urban and rural population environmental pollution as related to mortality. Alcohol abuse, smoking, heat, physical stimuli, vitamin deficiency, poor diet and insufficient exercise are listed among prominent causes of disease. Centralized concurrent studies of the chief causes of death are suggested to determine the effects of socio-economic, cultural and

behavioral distinctions of various population groups, and they must include data about number of children per family, income, migration, housing, social status, occupation, etc, as well as to pick up high risk groups and have sufficient data to elaborate measures for such groups.
[271-10,657]

UDC: 614.1:008

TRENDS IN POPULATION HEALTH DYNAMICS

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 81
(manuscript received 3 Oct 80) pp 5-9

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[Abstract] Organizational measures that help public health agencies to pick up existing or incipient adverse changes and take effective steps against them are discussed on the example of the population of Latvian SSR: mandatory gynecological screening of adolescent girls for early detection and treatment of diseases that could impair reproductive functions; detection of extragenital pathology among pregnant women by their obstetricians; genetic medical consultations and genetic screening of couples; screening of neonates for detection of hereditary chromosomal aberrations; mandatory medical certification of people about to get married, referring those who require it for further medicogenetic consultation; birth control for chronic alcoholics and schizophrenia; gradual [staggered] inclusion of the entire public in dispensary care. Trends referable to longer life expectancy, which can be obtained by lowering deaths due to accidents, poisoning, trauma, incidence of circulatory diseases and neoplasms, for which purpose a long-term program was worked out to lower morbidity and mortality, are discussed. Due consideration must be given to the fact that the scientific and technological revolution has drastically altered the nature of pathological processes in man, and this along with progress in medicine has resulted in appearance of highly specialized forms of medical care.
[271-10,657]

DETECTION OF CARDIAC ISCHEMIA IN PREVENTIVE SCREENING OF MALE POPULATION 40-59 YEARS OF AGE IN A MOSCOW CITY RAYON

Moscow KARDIOLOGIYA in Russian Vol 21, No 2, Feb 81
(manuscript received 20 May 80) pp 79-83

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[Abstract] Data referable to screening of a sample of males of one rayon were analyzed to determine the incidence of cardiac ischemia in its different forms, incidence of risk factor—hypertension, smoking, hypercholesterolemia—knowledge of having this condition, frequency of seeking medical care and of angina attacks, with the use of standard techniques: WHO questionnaire for detection of tension angina pectoris, resting EKG with coding in the Minnesota code. Risk factors in ischemia group (175 men) were compared to those without ischemia (141), both groups being picked out of a total of 1177 men representing 7 random 5% sub-samples in the rayon. The obtained figures (14.8% of those screened had ischemic heart disease, with or without myocardial infarction and different forms of angina pectoris, many of whom were unaware of being sick; hypertension in 41.1% of the ischemia cases, smoking in 45.7%, hypercholesterolemia in 26.6%) strongly indicate a need to conduct more specialized screenings for fuller and earlier detection of ischemic heart disease. The high incidence of smokers indicates that the control of this habit among patients with ischemic heart disease is not adequate or effective enough. References 11: 9 Russian, 2 Western.
[270-10,657]

DIAGNOSTIC ASPECTS OF FILARIASIS IN INDIVIDUALS RETURNING FROM TROPICAL AREAS

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 5, Sep-Oct 80 (manuscript received 18 Feb 80) pp 51-55

MIKHAYLOVA, V. A., LEPNEVA, S. M., SUBI, V. O., FIRSOVA, R. A. and SUPRYAGA, V. G., Republic Harbor Hospital, Kopli Municipal Polyclinic, Tallinn; Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] In 1976-1978, 314 specialists returning from Equatorial Guinea and 220 sailors, crew members on ships entering the tropics, were examined in Tallinn for filariasis. Filariasis was diagnosed in 100, 95 men and 5 women; of these 97 had returned from Equatorial Guinea and 3 were crew members on African lines. Symptoms were noticed in 13 while still in the tropics and in 87 after their return to the USSR. The shortest time between infection and manifestation was 3 months (1 patient) and the longest, 3 years and 2 months (2 patients); in the

majority, filariasis was noted within 1-2.5 years. Examination of venous blood revealed loiasis in 5 patients, wuchereriosis in 2 and dipetalonemiasis in 3. Examination of skin sections revealed onchocerciasis in 10. The Mazotti test (administration of diethylcarbamazine) was performed on 85 patients with positive findings in 82. Diagnostic problems were caused primarily by the low level of microfilariae in blood in early disease stages and early initiation of symptomatic treatment (diethylcarbamazine). The most common symptom was eosinophilia (in 80 patients) with increases from 6-60%; leukocytosis was noted in 25. Other symptoms were pruritus (82 patients), rashes on extremities (85) with papular (22) and macular (24) rashes predominating, localized edema of skin and subcutaneous fat (26) on extremities, enlargement of lymphatics (20), and subfebrile states (7). Conjunctivitis was diagnosed in five patients and cochlear neuritis in two. Disturbances in cardiovascular activity was noted in 19 patients, and changes in the EKG before filariasis in 26 and during filariasis in 61. References 5 (Russian). [290-9307]

UDC 362.6

INTEGRAL ANALYSIS OF NEED OF ELDERLY AND OLDER PEOPLE FOR OUTSIDE ASSISTANCE
DEPENDING ON FAMILY COMPOSITION

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 6, Jun 81
(manuscript received 1 Nov 80) pp 12-14

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[Abstract] The problems related to the scope and structure of the needs for the elderly population for various types of domestic assistance, the completeness of satisfying this need and the degree of request for communal and domestic services were determined by the Laboratory of Demography and Sanitary Statistics, Institute of Gerontology, USSR Academy of Medical Sciences, Kiev, on the basis of population selection of medical and social evaluation of the elderly. A direct correlation between the requirements of elderly people for outside assistance to meet their daily needs and their advancing age was established in the survey. Most of the elderly persons living at home have no spouse or grandchildren and live with elder children. Some of the single persons are physically incapacitated and many of them do not have access to communal and domestic services. This population of the elderly request domestic services more than other elderly persons who live with their families. A need was established to expand sociological investigations to determine the scope and nature of domestic services for the elderly and to work out the optimum organizational forms for solution of the problem.

[301-6521]

METHODS OF RADIO-INDICATION IN EVALUATING RENAL FUNCTION

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 6, Jun 81
(manuscript received 1 Nov 80) pp 43-46

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[Abstract] A method of determining the renal filtration fraction in two-indicator scintigraphy with one-time administration of a mixture of ^{99m}Tc -DTPA and ^{131}I -hippuran was investigated in 127 patients with chronic pyelonephritis, hypertension and chronic glomerulonephritis. The use of the urodynamic index to evaluate renograms makes it possible to correct the effect of diuresis on the renogram and increases the reliability of radioisotope renography in evaluating the evacuation-motor function of the kidneys. The filtration fraction of the kidneys can be determined separately for each kidney by two-indicator scintigraphy with simultaneous administration of ^{99m}Tc -DTPA and ^{131}I -hippuran. The functional and topographic condition of the kidneys can be obtained by renal scintigraphy. References 5: 2 Russian, 3 Western.
[301-6521]

MEDICINE

UDC 616.99-036.25-084.4:001.8

SCIENTIFIC AND ORGANIZATIONAL PROBLEMS IN RESEARCH DEVELOPMENT AND CONTROL OF PARASITIC TROPICAL DISEASES

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4, Jul-Aug 80 pp 3-7

[Article by F. F. Soprunov and A. S. Khromov, Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy of the USSR Ministry of Health, Moscow]

[Text] After political independence was won in the developing countries, not only were measures undertaken to create a new society and national economy, but changes were also made in the organization of the national public health systems. During the past 20 years significant progress has been achieved in a number of countries in expanding the network of medical institutions, training national medical personnel, and controlling certain diseases. Smallpox has been eliminated worldwide; yellow fever has almost completely disappeared, and the number of trypanosomiasis cases has dropped significantly in Africa. Up to the present time, however, infectious and parasitic diseases, in particular malaria, schistosomiasis, filariasis and other helminthiasis diseases, remain the most widespread diseases among the population of the developing countries.

The problem of malaria is becoming serious throughout the world. The number of malaria cases is increasing in certain regions of the southern part of Asia and Central America. As the World Health Organization (WHO) notes, the malaria situation remains unchanged in Africa and the South Sahara, i.e., approximately 87 percent of the population of the African region are living in hyperendemic or holoendemic areas, and the number of children dying from malaria exceeds 1 million per annum, according to evaluated data; altogether 91 percent of the population are not covered by antimalaria measures, and a significant segment of the population lacks medical service (6, 7, 19). The problem of malaria control remains one of the major ones in the developing countries, and its solution is bound up first of all with the elimination of economic backwardness and other colonial legacies in the social sphere, and also with the accumulation of successful experience with malaria control under concrete epidemiological conditions.

Schistosomiasis is the second most widespread parasitic disease after malaria. The problem of schistosomiasis is also bound up with the country's social-economic development. The creation of artificial reservoirs (Lake Volta in Ghana, the construction of the Kusu Dam in the Republic of the Ivory Coast and the expansion

of rice fields) is resulting in the spread of this disease. In a number of countries studies are being carried out to investigate new antischistosomiasis drugs, however no systematic control of these diseases has been conducted yet (12).

Filariasis and especially onchocerciasis are an important problem for a number of countries. Young, able-bodied persons, who could participate in the development of the country's economy, are being infested with onchocerciasis. At present, an onchocerciasis control campaign covering seven countries (13) is being conducted in West Africa with WHO assistance. Thanks to this project, the elimination of gnats from approximately 500,000 hectares of virgin soil for agricultural production is being planned. The positive results obtained in gnat control will be applied at all foci of onchocerciasis on the continent.

Control of other filariasis diseases—Wuchereriosis, acanthocheilonemiasis, loiasis and others—has still not been organized, but meanwhile, according to WHO data, approximately 240 million of the world population are infested with *W. bancrofti* and *B. Malayi*. Unfortunately, there is no reliable information on the world incidence of other filariasis diseases (1).

Despite the appreciable progress achieved in the fight against trypanosomiasis, control of this disease has not lost its urgency at present. Trypanosomiasis remains a serious obstacle to development of fertile lands in Africa, the area of which amounts to 6,000,000 square kilometers. A WHO interregional project on the epidemiology of trypanosomiasis and control of this disease has been under way in Africa since 1975 (14).

Analysis of the problem indicates the complexity of the existing situation, and the measures being carried out at present despite limited resources indicate the resolve of the governments of a number of countries to achieve positive progress in work on protection of the population's health.

During the past 20 years the ties of the Soviet Union and the other socialist governments with the countries of Asia, Africa and Latin America have been significantly strengthened. This was promoted by the development of international tourism and also by the bilateral economic and scientific-technical aid of the socialist governments to the developing countries. The threat of the importation of parasitic disease from tropical countries arose in this connection.

In a number of West European countries a rise is being observed in the number of cases of imported malaria. From 1967 to 1972, 5704 cases of imported malaria were recorded in 25 European countries, i.e., the number of cases per year increased from 839 in 1967 to 1240 in 1972 (17). In an 11-year period (1963-1973), 2155 cases were detected in the Soviet Union; in 1974-1978, 1615 malaria patients and parasite carriers were detected among Soviets and foreign citizens arriving from tropical and subtropical countries. Transmission of malaria from imported cases was observed in 10 populated areas of the Soviet Union; only 1-4 sick local residents were noted in each area (3, 15). According to WHO data, mortality from malaria increased in connection with weakness of immunity and late diagnosis (5). In 1967-1972 mortality from tropical malaria was 2.7 percent (18) in Europe. Cases of death from tropical malaria were noted in the USSR (2, 4, 16).

During 1973-1975, 1260 foreigners who had come to the USSR from 76 countries of Asia, Africa and Latin America and who had sought treatment were examined for helminthiasis. The percentage of invaded persons from countries of Southeast and Southern Asia was 66.1; from Latin America, 48.3; Africa, 37.3. A considerable number of persons were infected with trichocephaliasis (41.2 percent), ascariasis (27.3 percent), ankylostomiasis (20.1 percent) (10). In connection with the fact that ankylostomiasis has been eliminated as a mass disease in the USSR, importation may result in its being spread anew.

The urgency for all the socialist countries of the problem of controlling the importation of tropical parasitic diseases from abroad was confirmed at the first conference of tropicologists of the socialist countries, which was convened in Moscow in 1979. Consequently, the question arises of strengthening medical control of persons arriving from countries which are endemic with respect to malaria and other tropical parasitic diseases.

The public health organs and institutions of the socialist governments are confronting important issues connected with tropical parasitic diseases: organization of therapeutic-prophylactic and sanitary-epidemiological measures among persons departing for and working in tropical and subtropical countries; prevention of importation of tropical parasitic diseases to the socialist countries and training in tropical medicine of physicians sent to work in the developing countries.

The public health organs and the medical scientific institutions of the developing countries face major undertakings in studying the epidemiology of parasitic diseases in each country, in conducting studies on immunity to, and diagnosis and treatment of, these diseases and organizing control of them.

Our acquaintance with the system of organizing control of, and research on, tropical parasitic diseases in the national scientific centers of 10 countries of Africa revealed that in these countries there is no rational planning of scientific research on individual parasitic diseases directed at solving problems directly related to practical public health needs or centralized collection, analysis and preservation of appropriate information on the dissemination of parasitic diseases (12).

Joint work by scientists of the socialist and developing countries on all the problems enumerated could ensure thorough study of the most urgent problems of tropical medicine, promote the fastest possible solution of some of them and avoid unnecessary duplication. One of the conditions for effective collaboration between the socialist and developing countries in the study of tropical medicine is complete information on research in progress and problems in tropical medicine under investigation in different countries. This could be promoted by a Soviet journal of tropical medicine in which articles by tropicologists from different countries would appear, the principles of Soviet medicine would be popularized, and communication would be accomplished with Soviet physicians and physicians from the socialist countries working abroad and with physicians and scientists from the developing countries.

By proposal of the Soviet Union and other socialist and developing countries, a WHO Special Program on scientific research and training of personnel in tropical diseases was approved in 1976 and is underway (11). The objective of the scientific research of this program is the creation and improvement of means and methods of protecting the health of the population of the developing countries from a number of tropical diseases.

Since September 1978, on instructions from the the USSR Ministry of Health, the leading institute for the study of tropical parasitic diseases in the USSR, the Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy [IMPTM imeni Ye. I. Martsinovskiy] of the USSR Ministry of Health, has been performing the function of an All-Union Coordination Center for Tropical Diseases (8). This year the IMPTM imeni Ye. I. Martsinovskiy marks its 60th anniversary of operation. Under the direction of USSR AMN [Academy of Medical Sciences] Academician P. G. Sergiyev, the collective of the institute made a major contribution to solving the problem of malaria in the USSR and amassed most valuable scientific and practical experience in control of malaria and other parasitic diseases. In this connection, study by the organization of measures for controlling the spread of these diseases in the tropical belt zone is becoming of particular interest. Analysis of the preceding stages in the fight against tropical diseases may serve as the basis for scientific planning of research in this direction.

The major directions of the research of the IMPTM imeni Ye. I. Martsinovskiy in the immediate future are: study of parasitological situations and carriers of parasitic diseases in the countries of Africa and Asia; development of measures for controlling the intermediate hosts of the schistosomes; study of the socio-economic significance and development of methods of evaluating the economical effectiveness of measures to control parasitic diseases, study of biological methods of controlling the carriers of the parasitic diseases of man, and a number of other questions.

The institutes of the USSR Ministry of Health, the AMN, USSR AN [Academy of Sciences] and of the union republic academies must be enlisted on a broader scale by the All-Union Coordinating Center on Tropical Diseases in work on tropical medicine, both in WHO programs and on the basis of bilateral agreement between countries. Particular attention should be given to study of the socio-economic aspects of tropical diseases, organization of primary and specialized treatment of patients with tropical parasitic diseases, development of mass measures at foci and the search for, and introduction of, new antiparasitic agents.

In recent years the influence and role of the Soviet Union and other socialist countries has sharply increased throughout the world. The public health organizers of the developing countries have begun to understand that the problem of mass parasitic tropical diseases can be solved only with the guidance of a state medical service and the social-prophylactic principles of Soviet medicine. This was dramatically demonstrated by the Alma-Ata conference on primary medical and public health care in 1978 (9). Interest in Soviet science has increased abroad: in 1979 the IMPTM imeni Ye. I. Martsinovskiy received proposals of scientific collaboration from 12 tropical countries of Asia, Africa and Latin America. The plan for training tropicologists and conducting joint research is

being successfully implemented. Scientific centers are being created in tropical countries both for bilateral cooperation and in connection with WHO plans (Cuba, Ethiopia, the SRV). The cooperation of the USSR and other socialist countries with the developing countries in the field of scientific and organizational problems of research development and control of parasitic tropical diseases must be expanded and new forms of cooperation must be introduced and improved. In this connection, the question of training medical and scientific personnel from the developing countries in the study of tropical medicine and the organization of tropical parasitic disease control is very important. The IMPTM imeni Ye. I. Martsinovskiy of the USSR Ministry of Health and the republican institutes of medical parasitology could be bases for the completion of theses and candidates' dissertations by physicians from the developing countries who have received their educations in our country. The issue of training Soviet physicians and scientific coworkers for work in tropical medicine abroad also arises. It would be useful to institute specialization in the field of parasitic and tropical diseases by VUZ graduates, inasmuch as retraining of other types of specialists is not meeting the developing countries' requirement for parasitologist-tropicologists. This would make it possible to expand training of parasitologist-tropicologists, since parasitic tropical diseases are the basic problem for the public health services of these countries.

Soviet science can and must play a major role in the study of parasitic tropical diseases and control of them in the developing countries.

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CSO: 1840/288

RELIABILITY AND OPERATING TIME OF IMPLANTED ELECTRIC HEART-STIMULATING SYSTEMS

Moscow KHIRURGIYA in Russian No 2, Feb 81 (manuscript received 23 Oct 80)
pp 6-11

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head: Academician B. V. Petrovskiy) of the First Moscow Medical Institute
imeni I. M. Sechenov

[Abstract] Analysis was made of data referable to implantation of permanent heart stimulating systems at the All-Union Scientific Research Institute of Clinical and Experimental Surgery in 93 patients over a 10-year period. The patients ranged in age from 3 to 80 years, there were 37 females and 56 males, who were submitted to a total of 187 surgical procedures in this period: for adjustment of myocardial or endocardial stimulation in 114 cases, reimplantation of pacemakers or repair of conductor systems in 73. The most frequent cause of repeated intervention was depletion of power (41 cases), next were electrode-related complications (33 cases), wound infections (26). Domestic and foreign mercury-zinc batteries ran down or started to do so within 3-47 months in 58 cases; mean operating time of pacemakers constituted 23-30 months. Conductor systems were functional for 1, 5 and 9 years in 98, 61.3 and 49.7% of the cases of myocardial conductors and 100, 83.9 and 83.9% of the endocardial conductor systems. The various causes of damage to electrodes are discussed and merits of lithium batteries mentioned. Preventive implantation of transvenous electrode is recommended when surgical intervention is repeated, with removal of the temporary electrode no sooner than 5-6 days later, a period when complications arise the most often that require immediate cardiac stimulation. Figures 2; references 30: 8 Russian, 22 Western.
[272-10,657]

EFFECT OF PESTICIDES ON ATHEROSCLEROSIS DEVELOPMENT

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 6, Jun 81
(manuscript received 7 Apr 80) pp 24-27

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[Abstract] In view of reports of faster development of vascular atherosclerosis due to chronic pesticide poisoning, a study was made of 600 men (143) and women (457) whose jobs involved contact with organochlorine and organophosphorus pesticides, as well as 77 agronomists who also came in contact with organic mercury compounds; 249 people in other occupations without contact with chemicals or other toxic agents served as a control. Resting EKG, pulse wave propagation rate, rheoencephalography, total cholesterol, phospholipids, beta-lipoproteins and fractions thereof, as well as neurological signs were examined. All parameters studied were elevated in the "pesticide" group, as compared to the control, early signs of atherosclerosis of cerebral veins being demonstrable in some cases under 30 years of age, reliably more often at 31-40 years; coronary and aortic atherosclerosis was also found more often in the tested group, the incidence increasing as they reached 50 or more years of age. In view of the fact that long-term contact with pesticides is a contributing etiological factor, it is imperative to improve sanitary and hygienic conditions at work for such worker groups, as well as to implement additional medical and preventive steps to minimize manifestations of this pathology. References 10: 7 Russian, 3 Western. [268-10,657]

UDC 576.858.25.095.38:576.895.42].077.3

COMPARATIVE SEROLOGICAL AND VIROLOGICAL CHARACTERISTICS OF CIRCULATION OF
RUSSIAN SPRING-SUMMER TICK ENCEPHALITIS VIRUS IN ACARICIDE-TREATED AND UNTREATED
SECTIONS OF FOCUS

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 5,
Sep-Oct 80 (manuscript received 3 Jan 80) pp 74-78

KOROTKOV, Yu. S., CHUNIKHIN, S. P., KURENKOV, V. B. and RESHETNIKOV, I. A.,
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[Abstract] Data on the circulation of the Russian spring-summer tick encephalitis (RSSE) virus were collected during 1955-1970 in the Prokopen'yevskiy Rayon in the Kemerovskaya Oblast. The area was dusted with DDT in 1960-1962. Plot 1 was located on the taiga near cultivated forest steppes and plot 2 deep within

the taiga. Before treatment, the mammal population of plot 2 was higher but the number of Ixodes persulcatus larvae and nymphs was higher in plot 1. The number of I. trianguliceps larvae and nymphs was similar in both plots. DDT dusting did not affect the small mammal population. The I. persulcatus population decreased by 95-97% and I. trianguliceps by 74.7-90.5% during the year of treatment. Initial population levels of I. persulcatus and I. trianguliceps were restored within 5 and 7-8 years, respectively. Immunological tests for the RSSE virus were performed on small mammals trapped in the two plots. Virological tests with I. persulcatus imagoes were performed on albino mice. A correlation between the relative number of animals with RSSE virus antibodies and the abundance of tick larvae and nymphs parasitizing the animals existed only when the abundance index varied in the range from 0.0 to 0.58 ± 0.18 . A 0.1 increase in the abundance index within this range corresponded to a $4.6 \pm 0.7\%$ increase in the number of seropositive animals. There was no correlation at an abundance index over 0.58. The reduction in RSSE-virus circulation in the DDT-treated areas did not affect the virus' biological properties. These changes in antibody detection rate in small mammals suggest that these animals are infected with the RSSE virus primarily by parasitizing tick larvae and nymphs. Figures 2; references 12: 11 Russian, 1 Western. [290-9307]

UDC 615.22:[615.12+614.27](47+57)

TRENDS IN CONSUMPTION OF CARDIOVASCULAR AGENTS IN USSR

Moscow FARMATSIYA in Russian Vol 30, No 3, May-Jun 81
(manuscript received 1 Jul 80) pp 17-21

SHAKIROV, T. G., KOBZAR', L. V. and SHUGALEVA, M. V., Main Pharmacy Administration, USSR Ministry of Health, and All-Union Scientific Research Institute of Pharmacy, Moscow

[Abstract] The consumption of cardiovascular agents during the period 1963-1980 was analyzed on the basis of calculating the growth rates, average annual absolute increase and analytical equalization of dynamic series in a straight line and along a parabola to determine the established trends of consumption. The growth rates, increase and analytical equations were used to predict the possible future changes in consumption, which were then coordinated and refined on the basis of analyses of specialists and physicians working in the field. An increase in the need for diuretics and spasmolytic and hypertensive agents will be related to the introduction of new medicinals in therapeutic practice. The expected increase in consumption of cardiovascular agents will increase 1.4-1.5-fold by 1985. The intragroup and structural changes in the need for cardiovascular agents, the retrospective trends of consumption and prospects for the 11th Five-Year Plan will be taken into account during current and future planning. References 2 (Russian). [260-6521]

BIOCHOROLOGICAL STRUCTURE OF A SPECIES (WITH TAIGA TICK AS EXAMPLE)

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4,
Jul-Aug 80 pp 74-75

[Abstract] This 170-page manuscript (by E. I. Korenberg, "Biokhorologicheskaya struktura vida, na primere taezhnogo kleshcha" [Biochorological structure of a species, using a taiga tick as an example]) published in 1979 by "Nauka" (Moscow), is reviewed by S. P. Chunikhin. The biochorological structure of a single species, Ixodes persulcatus, the vector for Russian spring-summer encephalitis, is analyzed. The biochorological system is based on the units: population, population group, population class, regional population complex and finally species. These biochorological units are exemplified by descriptions of taiga-tick distribution in forests in the Udmurt ASSR and the Vyatka-Kama interfluvium. It is stated that a population of this tick may occupy an area from 5 to 500 km² and that the range of this tick consists of 59 regional population complexes. The same zoning system is applied to the range of the Russian spring-summer encephalitis virus. In this case, the range consisted of 69 regions, which were combined into seven groups. The principles for zoning the tick and virus ranges and the systematized data on foci may be useful in a national land survey of natural foci of this encephalitis. Also included are criticisms of Korenberg's book, which focus primarily on terminology and alleged inaccurate and unsubstantiated statements.
[289-9307]

UDC 614.449.57:615.285.7]:576.895.711.01(470-25)

CHANGES IN POPULATION DENSITY OF MOSQUITO ANOPHELES [MACULIPENNIS] MESSEAE FALL. 1926 IN MOSCOW OBLAST AFTER TERMINATION OF DDT TREATMENT (WITH SOLNECHNOGORSKIY RAYON AS EXAMPLE)

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4,
Jul-Aug 80 (manuscript received 29 Oct 79) pp 68-69

SOKOLOVA, L. V. and VOLEGOVA, K. V., Moscow Oblast and Solnechnogorskaya Sanepid Stations

[Abstract] The phenology and population density of Anopheles maculipennis messeae, a malaria vector, were studied in Yakimanovskoye in 1941 and 1948-1978. The incidence of malaria increased here after the completion of the Istrinskiy reservoir in 1937, reaching 1579 in 1946, 1232 in 1947 and 2000 in 1948 per 10,000 inhabitants. The mosquito population dropped sharply after DDT and HCCH [hexachlorocyclohexane] treatment in 1953, but began to increase after 1959 when control measures were discontinued. By 1977, the mosquito population reached levels recorded in the 1940s. Since this is an area at high risk for malaria owing to the high population mobility because of the recreation facilities and to the importation of malaria by individuals returning from the tropics, constant

monitoring of the mosquito population and organization of control measures are recommended. Figures 1.
[289-9307]

UDC 576.895.42.095.6

EFFECT OF GROUP DENSITY OF MOLTING OF TICKS (ARGASIDAE, IXODOIDEA) IN
EXPERIMENTAL STUDY

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4,
Jul-Aug 80 (manuscript received 7 Jun 79) pp 42-48

VASIL-YEVA, I. S. and YERSHOVA, A. S., Institute of Medical Parasitology and
Tropical Medicine imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] The elucidation of natural population control mechanisms is a new trend in vector control. The effect of population density on molting was studied in Ornithodoros papillipes, O. tartakovskyi and O. moubata, which are primary vectors of relapsing fever. The ticks were fed on guinea pigs and rabbits and housed in test tubes in groups of 1, 2, 5-30 and 15-200. The three species had similar reactions to the increase in population density. In comparison with molting of solitary nymphs, the molting of grouped nymphs was longer and the proportion of nonmolting nymphs requiring an additional feeding was higher; there was a decrease in the proportion of imagoes after molting of older nymphs with a corresponding increase in nymph numbers. Adaptive responses of ticks to the higher population density included delayed and asynchronous growth in the groups as a whole and an increase in mortality. The higher density had a greater effect on O. papillipes and O. tartakovskyi, which have a slower premolting growth rate. Molting followed an S-shaped curve with a steep exponential phase; limiting factors came into play when 70-90% of the nymphs had molted. The mechanism of the effect of the higher density is perhaps related to the accumulation of metabolites and tactile perception of other nymphs. These data indicate that population density should be considered in experimental studies and raising of ticks. The patterns of molting at a higher density in the experimental model also apply to natural populations. Figures 4; references 13: 10 Russian, 3 Western.
[289-9307]

TICKS AND MITES AS ECTOPARASITES OF WILD AND DOMESTIC ANIMALS IN AFGHANISTAN

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4, Jul-Aug 80 (manuscript received 4 Feb 80) pp 37-42

ARSEN'YEVA, L. P. and NERONOV, V. M., Institute of Medical Parasitology Tropical Medicine imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] Lists of tick and mite species, their distribution primarily in eastern Afghanistan and hosts, and epidemiological and epizootiological data gleaned from recent literature are presented. Few ecological data were found. A total of 29 species of hardbacked ticks with Hyalomma, Ixodes and Haemaphysalis species predominating, 11 species of softbacked ticks with Argas species predominating, 28 species of gamasid mites with Laelaps and Hirstionyssus species predominating, and 13 species and 1 subspecies of chigger mites were found. Isolated from Argas hermanni were 14 strains of the Quarantilla virus, a B virus, the Uukuniemi virus and a new group B virus, Royal Farm. Serological data indicate the presence of rickettsias causing typhus, Q fever, rickettsialpox and scrub typhus. In Afghanistan, ticks and mites play a greater role in the epidemiology and epizootiology of various zoonoses than previously believed. Further research on the isolation of causal agents from ticks and mites is recommended. Figures 1; references 36: 11 Russian, 25 Western. [289-9307]

COMPARATIVE CHARACTERISTICS OF REPRODUCTION OF GETAH AND WEST NILE VIRUSES IN CELL CULTURES OF THREE MOSQUITO SPECIES

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4, Jul-Aug 80 (manuscript received 2 Jan 80) pp 34-37

IZOTOV, V. K. and CHUNIKHIN, S. P., Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow

[Abstract] Data are presented on the reproduction of Getah (strain MM 2021) and West Nile (strain V-956) viruses in cell cultures of Aedes aegypti, A. albopictus (Igarashi line) and A. pseudoscutellaris, incubated at 26°C. Both togaviruses grew best on A. albopictus cell cultures. The Getah virus titer (given in logs of plaque-forming units per milliliter of culture) was 1.1-2.3 logs higher at 24 hr and of the West Nile virus 0.2-0.6 logs higher at 4-6 days in A. albopictus cell cultures than in the other two cultures. The conventional medium 199 with the addition of 10% calf serum and small amounts of enriched medium C-45 was used for culturing the mosquitoes without a decrease in viability. Figures 1; references 8: 3 Russian, 5 Western. [289-9307]

CRIMEAN RICE FIELDS AND THEIR ANOPHELOGENIC SIGNIFICANCE

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4, Jul-Aug 80 (manuscript received 20 Sep 79) pp 28-31

ALEKSEYEV, Ye. V., Crimean Anti plague Station, USSR Ministry of Health, Simferopol'

[Abstract] Rice fields in Crimea are a source of mosquitoes from mid-July to late September. Distribution of larvae of malaria-transmitting mosquitoes depended on planting density, trophic factors determined by water clarity and its illuminance, and wind. The highest number of Anopheles larvae of older instars per square meter were found in dense rice and cockspur stands and of younger larvae in sparse and normal stands. Blast-infected rice fields also had elevated mosquito populations reaching 300 larvae per square meter. Optimal conditions for larval growth, particularly for A. atroparvus, were found in clear water with a high mineralization and high organic-matter level. Light conditions affected plankton and algal growth, which serve as food for larvae. The highest survival of larvae occurred in rice fields with a high population of microphytes and diatoms, i.e., in dense stands and cockspur brakes. Larval counts were higher in leeward areas within 1.5 km of rice fields; this was related to the distribution of female mosquitoes by prevailing winds. Figures 2; references 8: 7 Russian, 1 Western.
[289-9307]

UDC 616.936.1-085.283.926-035.2-02:576.893.192.6.097.22

GENERAL ASPECTS OF PROBLEMS ASSOCIATED WITH CHLOROQUINE-RESISTANT TROPICAL MALARIA

Moscow MEDITSINSKAYA PARAZITOLOGIYA I PARAZITARNYYE BOLEZNI in Russian No 4, Jul-Aug 80 (manuscript received 3 Apr 80) pp 11-15

ORLOV, V. S., Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy, USSR Ministry of Health, Moscow

[Abstract] It became apparent only in the mid-70s that the range of chloroquine-resistant malaria was much more extensive than previously indicated. Chloroquine resistance is particularly prevalent in Southeast Asia, a situation which is attributed to its topography, high endemic malaria level, the primary vectors Anopheles balabacensis and A. minimus, migratory workers in these areas, and the prolonged stays of nonimmune individuals in areas with resistant Plasmodium falciparum mutants and high malaria transmission rate. Another problem here is the resistance of mosquitoes to insecticides. Despite advances in procedures for determining resistance and typing of P. falciparum strains by, for example,

differences in isozyme spectra, the mechanism of action of chloroquine on P. falciparum has not been adequately studied and the genesis of resistance of P. falciparum to 4-aminoquinoline remains unclear, although it is presumed to be a mutation in the nuclear gene followed by selection of mutants by exposure to drugs. The worldwide distribution of malarial strains is also discussed. References 12 (Western).
[289-9307]

UDC 616-092.12-057:613.68

DETERMINING STATES ON BOUNDARY OF NORMAL AND PATHOLOGICAL IN SEAMEN ON VOYAGES

Moscow SOVETSKAYA MEDITSINA in Russian No 5, May 81 pp 75-78

ALEYNIKOVA, L. I., Professor and GOZHBEL'YANOV, A. N., candidate of medical sciences, Chair of Hospital Therapy, Odessa Medical Institute

[Abstract] Approaches to diagnosis of states on the boundary between normal and pathological were investigated in seamen during voyages by using a combination of clinical-instrumental and psychometric methods. The investigations included a questionnaire to determine risk factors of ischemic heart disease and hypertension, hereditary aggravations of mental and somatic diseases, communicable somatic diseases and the nature of personal reactions to stress situations during childhood and adulthood. The test subjects included 50 male crew members of a passenger cruise ship sailing in the Atlantic Ocean. The investigation revealed seven persons with transferred somatic diseases, six with hereditary somatic aggravation and two with mental aggravation. All 15 persons noted adequate responses to significant stress situations during childhood and adulthood. The seamen were examined individually to analyze the state of adaptation to stress situations. Indicators of pulse frequency, arterial pressure, stress index, tolerance coefficient, vegetative index, body mass, variations of EKG, degree of neuroticism (Eysenk) and pulse reactivity should be used to detect boundary states between the norm and pathology. References 7 (Russian).
[261-6521]

PHYSIOLOGY

UDC 612:611.85

ANALYSIS OF FORCES STIMULATING HUMAN SEMICIRCULAR CANALS DURING MOVEMENT IN ROTATING SYSTEM

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 6, Nov-Dec 80 (manuscript received 30 Oct 79) pp 935-938

VOROB'YEV, O. A.

[Abstract] A mathematical analysis was made of the mechanical forces acting on the human semicircular canals in experiments involving rotating chairs and variable inclination of the head. The resultant data demonstrated that in a situation with double rotation, displacement of the endolymph and dislocation of the cupula in the semicircular canals are not determined by precessional or cross-related angular velocities, but depend on the 'usual' angular accelerations which can be readily calculated. The analysis presented here for determining the extent of stimulation of the semicircular canals is not limited to rotating chair situations, but is equally applicable to other systems of rotatory movement. Figures 2; references 7: 1 Western, 6 Russian.
[332-12172]

UDC 616.8-009,836-085,814.1

ACUPUNCTURE AS METHOD OF REGULATING NIGHT SLEEP OF HUMANS

Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 6, Jun 81 (manuscript received 1 Nov 80) pp 62-64

AKHTYAMOV, I. Sh., Kazan' Institute for the Advanced Training of Physicians imeni V. I. Lenin

[Abstract] Clinical and electrophysiological studies were conducted on 50 patients suffering from insomnia caused by psychogenic functional suffering to study the clinical effectiveness of acupuncture therapy. The 30 males and 20 females with an average age of 41 years showed substantial improvement in sleep structure indicated by night polygraphic studies and showed improvement in

personality. The type of needle reflexotherapy method used determined the close correlation in the changes of sleep structure. The slow sleep phase was most affected by corporeal acupuncture and the fast sleep phase was affected by auricular acupuncture. References 24: 17 Russian, 7 Western.
[301-6521]

UDC 591.185.34:541.57

ANALYSIS OF INTRACELLULAR RESPONSES OF NEURONS OF OLFACTORY BULBS OF AMPHIBIANS AND REPTILES TO ODORS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 11, Nov 80
(manuscript received 27 Apr 79) pp 49-56

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imeni M. V. Lomonosov

[Abstract] Whether the neurons of the olfactory bulbs are capable of evaluating the qualitative specifics of odor molecules and the parameters in which responses of these neurons most clearly manifest the specificity of responses were studied in reptiles and frogs. The effect of 10 electron-donor and electron-accepter odorants on the activity of the neurons of the olfactory bulb was recorded in common frogs and Horsfield's terrapin. A total of 148 neurons was recorded in the olfactory bulb of amphibians and 96 neurons were recorded in the reptiles. A relationship of the pattern of pulse activity of neurons to the energy parameters of odorants was detected in 7 percent of the neurons of both amphibian and reptile olfactory bulbs. Approximately 70 percent of the neurons are capable of distinguishing the odor molecules by energy parameters upon analysis of the latent periods of neuron responses at the level of depolarization and hyperpolarization shifts of the membrane potential. Significant changes in the electrical activity of the olfactory bulb occur in the spring, mainly among amphibians. Odors are assumed to be analyzed by the neurons of the olfactory bulb by multifactor analysis of the energy parameters of odor molecules. Figures 1; references 18: 3 Russian, 15 Western.
[298-6521]

USING ELECTRIC FIELD SURROUNDING MAN TO STUDY RESPIRATORY PROCESS MECHANICS

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: BIOLOGIYA in Russian No 9, Issue 2, May 81 (manuscript received 7 Oct 79) pp 58-63

YEGOROV, V. N., MUZUROV, S. V., GAVRILOVA, N. I., KHARAUZOV, K. N. and ZABOTIN, V. I.

[Abstract] Respiration of 12 healthy and 2 sick subjects was recorded by measuring the electric fields emitted by them, which is a new recording principle; to prove the reliability of obtained respiratory parameters and diagnostic value of this method, a concurrent control was used with known methods of recording respiration in clinical practice (tensiography, air methods and spirometry), on a 4-channel EEGP-4-02 ink-tracing electroencephalograph, with concurrent recording of spirometry, tensiograms and electric fields in seated position, and in both seated and supine position without spirometry. A dipole antenna with a 60-mm range was placed 20-50 mm from the subjects. Very similar data were obtained on tensiograms and electric field-pneumograms, as well as tensiograms and electric field electrograms. With appropriate calibration of the electric field sensor with regard to frequency and amplitude, the quantitative features of respiratory excursions and changes in tidal volumes can be determined, in addition to respiratory curves, from which parameters of the respiratory process (nature of excursions, type of respiration, symmetry of respiratory movements in both halves of the chest, rhythm, depth, etc.) can be determined. Figures 3; references 11 (Russian). [266-10,657]

UDC 616.831-008.939.15+616.15-097.5-Q2:616.831-097.2]-02:613.863

ACTIVATION OF LIPID PEROXIDATION IN BRAIN AND PRODUCTION OF ANTIBODIES TO BRAIN ANTIGENS DURING STRESS

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 81 (manuscript received 15 Jan 81) pp 65-66

BOGDANOVA, Ye. D., KAGAN, V. Ye., KULIYEV, I. Ya., MEYERSON, F. Z. and PRILIPKO, L. L., Institute of Psychiatry, USSR Academy of Medical Sciences, Moscow; Moscow University imeni M. L. Lomonosov; and Institute of General Pathology and Pathological Physiology, USSR Academy of Medical Sciences, Moscow

[Abstract] The level of antibodies to brain antigens in the peripheral blood of rats in which processes of lipid peroxidation in vivo were induced, subjecting the animals to emotional-pain stress, was investigated to check the hypothesis that induction of lipid peroxidation processes in the membranes of the cerebral nerve cells generates antibodies to brain antigens during stress. Lipid peroxidation products accumulate in the rat brain and the titer of antibrain

antibodies to water-soluble and membrane-bound antigens in the blood increases when emotional-pain stress is induced in animals. Accumulation of lipid peroxidation products is eliminated when the free-radical reaction inhibitor ionol is administered to the animals in vivo. This inhibitor totally inhibits the appearance of antibrain antibodies. Barrier antigens are released and enter the blood upon activation of lipid peroxidation processes during stress. Figures 2; references 7: 5 Russian, 2 Western.
[259-6521]

UDC 577.391:547.963.3

EFFECT OF RADIOPROTECTIVE AGENTS 2-MERCAPTOETHYLAMINE AND 5-METHOXYTRYPTAMINE
ON ACTIVITY OF SOME REPAIR ENZYMES

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 4 Feb 80) pp 198-202

BELYAKOVA, N. V., KRAVETSKAYA, T. P. and KRUTYAKOV, V. M., Leningrad Institute
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[Abstract] The effect of 2-mercaptoethylamine (cysteamine) and 5-methoxytryptamine (mexamine) on the activity of DNA-polymerase I and exonuclease III from *E. coli*, DNA-polymerases α and β , endonuclease I and 3'-endonuclease from the chromatin of the rat liver was studied to compare the effect of protectors on the activity of purified repair enzymes and corresponding chromatin activity, nuclei and cells. A quantity of only 20 millimoles of mexamine appreciably reduces the activity of DNA-polymerase I and DNA-polymerase α . DNA replication in the cell is retarded by the protectors, which diminishes reproductive death and increases the length of repair. The action of the protectors is modulated by the quality of the DNA matrix, which is strongest in the activity of DNA-polymerase β . The protectors do not affect the action of exonucleases in nonirradiated DNA and have no effect on the activity of chromatin endonuclease I and nuclease degradation of DNA newly synthesized in irradiated chromatin in vitro. The radioprotectors affect the activity of the repair enzymes depending on the quality of the DNA-substrate or DNA-matrix, whether native or irradiated DNA, deproteinized DNA or DNA in the chromatin and nuclei. Moderation of nuclease degradation enhances the effectiveness of repair. Figures 1; references 18: 12 Russian, 6 Western.
[234-6521]

POSSIBLE RECOVERY OF HEMOPOIESIS WITH INTESTINAL FORM OF ACUTE RADIATION SICKNESS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 4 Mar 80) pp 211-215

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[Abstract] The effect of transplantation of different quantities of isologous bone marrow on recovery of hemopoiesis was studied in Wistar rats with intestinal form of acute radiation sickness. The rats went through a simultaneous course of therapeutic measures to prevent intestinal death. Myelotherapy alone is ineffective in restoration of hemopoiesis since the animals die 3 to 5 days later if the small intestine is critically affected. Massive doses of isologous myelocaryocytes contribute to intensive recovery of hemopoiesis and prevent intestinal death when combined with the corresponding treatment. The potential for cellular counterinfection protection and development of infectious complications is reduced with a moderate reduction in the number of nucleus-containing cells in the bone marrow in cases of late death of the animals. The number of myelocaryocytes decreased moderately in animals that survived the intestinal syndrome for 90 days as a result of treatment. Figures 2; references 10: 7 Russian, 3 Western.
[234-6521]

UDC 577.391

CYCLIC NUCLEOTIDES AND RADIORESISTANCE, REPORT 5: CYCLIC NUCLEOTIDES AND RADIORESISTANCE OF E. COLI CULTIVATED ON DIFFERENT NUTRIENT MEDIA

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 21 Feb 80) pp 224-230

KULINSKIY, V. I., MIKHEYEVA (MAMAVKO), G. A. and ZEL'MANOVICH, B. M.,
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[Abstract] Different nutrient media were used to study the significance of endogenous cyclic nucleotides on the radioresistance of E. coli and to determine the possible identity or close resemblance of radiobiological and biochemical glucose effects. A similarity was shown between the biochemical and radiobiological glucose effects in that glucose has a marked effect on functions of the bacterial cell, there are both transitory and permanent effects, the glucose effects are reproduced by glucose-6-phosphate and there are greater differences between cells in the logarithmic and stationary phases. The glucose effects are completely removed when cyclic adenosine monophosphates are added to the nutrient medium. No correlation could be found between radioresistance and the concentration or ratio of endogenous cyclic nucleotides in the nutrient medium. Figures 4; references 12: 4 Russian, 8 Western.
[234-6521]

NEW TEST TO ESTIMATE INTENSITY OF DISSEMINATION OF BACTERIA IN IRRADIATED MICE

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 19 May 80) pp 249-253

KLEMPARSKAYA, N. N. and ULANOVA, A. M.

[Abstract] A new test was developed to estimate the intensity of test microbe dissemination in irradiated and unirradiated mice. There was intensive circulation of the microbes in the blood of both unirradiated and irradiated mice after 30 minutes and the microbes were retained in the spleen and liver. The intensity of microbe penetration into the blood is enhanced by irradiation in mice having no external infection. A latent infection in the animals inhibits the dissemination of the test microbe. Stimulation of the normal autoimmune system can control dissemination of the microbes through the blood. Dissemination of the bacteria is essentially not affected by administration of protectors. Figures 2; references 9: 8 Russian, 1 Western.
[234-6521]

EFFECT OF MAGNETIC FIELD ON OXYGEN PRESSURE, RADIOSENSITIVITY AND GROWTH OF SOME EXPERIMENTAL TUMORS

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 29 Mar 80) pp 255-261

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[Abstract] The effect of variation of partial oxygen pressure in liquid media and directly in living tumors was investigated to determine the effect of a permanent magnetic field on these changes. Partial oxygen pressure increases significantly in Pliss lymphosarcoma and RS-1 tumors when exposed to a magnetic field and decreases after the magnetic field is removed. The variation of partial oxygen pressure is similar in Walker carcinosarcoma, but is different for living and killed rats. The growth rate of tumors decreases appreciably after each session of combination magnetic and radiation effects with an increase of partial oxygen pressure in magnetized tumors. Periodic one-hour magnetic exposure preceding irradiation causes a marked zigzag growth of tumors, while 5- and 30-minute exposure to a permanent magnetic field has essentially no effect on tumor growth. Figures 3; references 9: 7 Russian, 2 Western.
[234-6521]

EFFECT OF IONIZING RADIATION ON PHOSPHORYLATION OF AMINOACYL-tRNA-SYNTHETASES ISOLATED FROM RAT LIVER

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 21 Jan 80) pp 262-264

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[Abstract] The possibility of phosphorylation of aminoacyl-tRNA-synthetases and the effect of ionizing radiation on phosphorylation of aminoacyl-tRNA-synthetases and aminoacylation processes of tRNA were studied in rat livers in vivo and in vitro. The specific activity of total preparations of amino-tRNA-synthetases isolated from irradiated rat livers increases while the phosphorus content in the livers remains unchanged. X-radiation reduces the level of aminoacylation of tRNA by methionine, lysine and glycine as a result of the higher radiosensitivity of tRNA. tRNA shows the higher sensitivity among the two components of the aminoacylation reaction upon exposure to ionizing radiation. Aminoacyl-tRNA-synthetase activity is disturbed to a lesser extent, although tRNA is aminoacylated by lysine. Biosynthesis of proteins is disrupted during the initial phase with variation of phosphorylation of amino-tRNA-synthetases upon exposure to ionizing radiation. References 13: 5 Russian, 8 Western.
[234-6521]

UDC 577.391:612.419

POSTRADIATION RECOVERY OF BONE MARROW AFTER PARTIAL IRRADIATION

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 21 Aug 79) pp 273-277

POZHARISSKAYA, T. D. and SOKOLOVA, Ye. N.

[Abstract] The changes in the number of myelocaryocytes of different maturity were studied, the proliferative activity of hemopoietic cells was estimated and the number of cells capable of DNA synthesis were determined in different growths of bone marrow during the first 5 days after total and partial irradiation of mice. The five-day period is marked by a response of the bone marrow directly to radiation up to three days after exposure and by manifestation of shielded sanguiferous tissue up to the fifth day that leads to early activation of recovery processes in activated sections of the bone marrow. The recovery process is noted by an increase in the number of nucleus-containing components and of young cells capable of proliferation. Figures 1; references 8: 6 Russian, 2 Western.
[234-6521]

ROLE OF ENDOGENOUS GLUTATHIONE IN RADIOPROTECTIVE EFFECT OF ANOXIA

Moscow RADIOBIOLOGIYA in Russian Vol 21, No 2, Mar-Apr 81
(manuscript received 11 Jun 80) pp 277-280

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[Abstract] The dependence of the level of anoxic protection of cells of Ehrlich ascites carcinoma on the content of endogenous glutathione in them was studied by inoculation of the cells into the abdominal cavity of hybrid mice. The glutathione content was reduced by means of N-ethylmaleimide and the glutathione level was determined from the content of nonprotein sulfhydryl groups. Anoxic protection diminishes gradually with total removal of glutathione by diamide and with different degrees of binding it. The degree of anoxic protection decreases regularly as the degree of nonprotein thiole percentage increases. Glutathione has a specific determining role in the radioprotective effect of anoxia, Figures 2; references 16: 4 Russian, 12 Western.
[234-6521]

UDC 591.111.1:599.323.4:614.875

EFFECT OF MULTIPLE LASER IRRADIATION OF RATS ON ACTIVITY OF BLOOD PLASMA PHOSPHATASES

Moscow BIOLOGICHESKIYE NAUKI in Russian No 11, Nov 80
(manuscript received 26 Jun 79) pp 25-28

SERYKH, M. M., DREVAL', V. I., AVERKIYEVA, O. N. and SOKOLOVSKIY, A. V.,
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[Abstract] The effect of multiple laser irradiation on the activity of alkaline and acid phosphatases of blood plasma was studied in 80 white rats. The activity of acid phosphatase of the blood plasma was less subject to change than was the activity of alkaline phosphatase. The output of irradiation affects the level of activity of the enzymes. The greater variability in the activity of the alkaline phosphatase is determined by localization of the enzyme in the plasmatic membranes which are in direct contact with extracellular metabolites. The hormone balance in the organism also largely affects the activity of the alkaline phosphatase. The animals did not show variation of blood plasma phosphatase activity after 8 and especially after 10 exposures of laser irradiation. The level of acid and alkaline phosphatase activity is used as an indicator of the functional state of the organism and of resulting pathological deviations. Figures 1; references 21: 19 Russian, 2 Western.
[298-6521]

CRYOGENIC SAMPLER FOR RADIOACTIVE GASES AND AEROSOLS

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 81
(manuscript received 23 Apr 79) pp 59-61

GAVRILIN, Yu. I., MARGULIS, U. Ya. and KHRUSHCH, V. G.

[Abstract] Description is provided of a cryogenic sampling device found effective in collecting radioactive and nonradioactive gases and aerosols. Essentially, the device consists of a funnel-like collector within a liquid nitrogen filled sleeve. The low temperature of the funnel (-196°C) results in liquefaction of incoming air or gases, with subsequent collection of the condensate and its analysis. The current device can sample 60-80 liters/min of air or gas.

Figures 2.

[338-12172]

PUBLIC HEALTH CONSIDERATIONS OF NUCLEAR POWER

Moscow GIGIYENA I SANITARIYA in Russian No 2, Feb 81
(manuscript received 8 Apr 80) pp 35-37

MAREY, A. N.

[Abstract] Since availability of adequate energy resources is one of the principal cornerstones of communism in the USSR, considerable advancements are being made in the development of nuclear power stations and allied nuclear and thermal installations. Despite considerable progress in insuring safe operation of such plants, problems still exist in relation to the decontamination of radioactive waste and its disposal, as well as in the handling of large quantities of heated water and other forms of thermal pollution. It is obvious that further directives must be formulated for a more rational location of such plants to minimize potential negative environmental effects, and to encourage more efficient utilization of the by-products, particularly heat.

References 13: 6 Russian, 7 Western.

[337-12172]

DIFFERENCES IN MOLECULAR MECHANISMS UNDER ACTION OF HIGH AND LOW DOSES OF GAMMA RADIATION

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGICHESKAYA in Russian No 6, Nov-Dec 80 (manuscript received 9 Jan 80) pp 883-890

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[Abstract] Dose-effect studies with high (0.5-40 Gr) and low doses of gamma irradiation have shown that biological membranes appear to be the primary target with low doses. The sequence of events seems to be formation of quinones which, in extremely low concentrations (10^{-7} to 10^{-8} M), act on the membranes to initiate activation of adenylate cyclase in analogy to the mechanism of action of a number of hormones. The resultant formation of cAMP and of other secondary effectors leads to derepression of genes and synthesis of mRNA and enzymes, which reflects the stimulatory effects of low-dose radiation. This mechanism of action differs significantly from that seen with high doses whose lethal effects are predicated on damage to DNA and chromatin. Figures 2; references 39: 17 Russian, 22 Western.

[332-12172]

HUMAN FACTORS

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HUMAN FACTORS IN WORK PERFORMANCE

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(manuscript received 2 Jul 80) pp 24-27

[Article by A. B. Leonova, candidate of psychological sciences, MGU [Moscow State University]: "Aspects of Man's Psychological Function"]

[Text] The process of work performance by man is accompanied by the development of certain psychological states that have a positive or negative effect on the efficiency of work. The specific features in the formation of these conditions are determined by various factors. These include the type of work that is being done, the conditions under which it is done, the role and function of an individual in solving work problems, and the internal reserves and individual psychological characteristics of the person. For this reason the actual status of the individual arising from a particular situation is always unique. At the same time, among the multitude of individual conditions, there are clearly defined classes of functional states. For example, each one of us can easily recognize the conditions of fatigue or emotional excitement, the optimal state for performing work, and apathy or depression. In dealing with the problem of diagnosing or predicting the development of a working man's state of mind the problem of classification and description becomes especially important. Without attempting to present in this article a complete classification of the entire spectrum of the functional conditions of man, let us examine only the most typical, those which are traditionally studied within the framework of psychological research, and try to establish the prevalent characteristics of those.

A basic premise in the majority of modern research on man's condition is the idea of the existence of an ordered multitude, or continuum, of conditions.(2). Changes in the actual state of the individual can therefore be presented in the form of a movable point within this continuum.

In connection with this it is expedient to utilize the terminology presented by A. A. Genkin and V. I. Medvedev, who make a distinction between extensive and intensive groups of conditions (3). According to these authors, extensive psychophysiological conditions have different neurophysiological bases and a different psychological content and for this reason they are not comparable within a single scale (for example, the primarily different conditions of fatigue and emotional excitement, stress and monotony). Intensive psychophysiological states, which are basically similar in content, can be compared within a single scale (thus we have the traditional enumeration of various levels of keeping awake, fatigue or emotional excitement).

Naturally, this type of division is very conditional and the proposed scales of a particular class of intensive conditions is hypothetical. This is justified even in those cases in which the scale is constructed on the basis of objective data (for example, the scale for the levels of keeping awake is constructed according to the indicators for the electrical activity of the brain). The main difficulty in such a scheme is the fact that an analysis of several conditions reveals an extensive-intensive nature. Thus, "the condition of keeping awake is not a uniform, homogenous state, but a complex integration (interaction) of elements such as motivation, fatigue, somnolence and so forth...In addition to the general factor that determines the level of pronouncement of the condition, various specific peculiarities, or extensive components, almost always play a role" (3, p 11).

Still, the practical use of this standard system is useful because it enables us to place emphases as a result of numerous and varied studies and to isolate those basic types of functional conditions which require special study. An analysis of the changes in an individual's condition during a work performance of long duration is made with the aid of a study of the phases in the dynamics of fitness for work, which in turn includes the study of the development and special features of the state of fatigue. An examination of activity from the point of view of the amount of energy expended presupposes the isolation of various degrees of stress. The basis for the classification of the condition can be the characteristics of the process conditions and the type of labor being performed (for example, the isolation of various types and stages of developing monotony). On this same basis it is also possible to have a developed classification of conditions arising from information streams of various intensities—the conditions of sensory isolation, of sensory deprivation or informational overload of various degrees. An analysis of motivational-personal factors that affect the effectiveness of performance resulted in the singling out of a number of emotional conditions or various types of emotional stress. An evaluation of the effectiveness of an individual's performance from the point of view of energy expenditure traditionally presupposes the utilization of the concepts of activation and levels of staying awake.

It is difficult to clearly define the aforementioned terminology because usually this is done within the context of individual research. The definitions of various authors frequently do not coincide. This makes the question of the relations of these various concepts to each other much more difficult. However, the need to carry out such a task is obvious. Later we will try to succinctly describe some of the modern directions being taken by research into functional conditions which are most frequently utilized in applied ergonomic research.

The activation theory is most frequently utilized in physiological and psychological studies analyzing the dynamics of the functional state of an organism and the effectiveness of an individual's performance (2, 14). In the most general sense the concept of activation means the degree of mobilization of psychophysical resources that is necessary to complete an act of behavior, determined by the actual potential of the organism and by the task that is set before the subject (17). A change in the level of activation manifests itself in the dynamics of behavioral reactions, the spectrum of which forms a scale of wakefulness levels (a continuum of states ranging from sleep to overexcitement (2)). It is assumed that the relationship between the level of activation and wakefulness is direct--

a growth in activation results in a higher level of wakefulness. However, the continuous increase in activation does not result in a linear increase in the effectiveness of task performance. This relationship, known in psychology as the Yerkes-Dodson Law and expressed in the form of an inverted U, attests to the existence of optimal zones for activation and wakefulness levels (13).

In recent years the traditional concepts on the relationships between the levels of activation and wakefulness have been enriched with data concerning the qualitative variety of functional conditions arising in relatively limited zones of the "sleep-wakefulness" continuum. Various types of sleep are being determined and their neurophysiological mechanisms are being studied. Of special interest is the study of the spectrum of various states of active wakefulness--the most important and within the framework of traditional theory the actually uncalculated segment of the scale of wakefulness levels. Thus, for example, neurophysiological and electrophysiological proof has been obtained of the possibility of isolating a certain class of functional states of arbitrary attention (14). Thus, within the framework of the concepts under examination it is possible to construct a developed hierarchy of functional conditions.

The concept of activation is indebted for its success to the activation theory of D. Lindsiki and the data regarding the functioning of the non-specific central apparatus--the reticular formation of the brain (2, 17). The function of the latter directly determines the level of activeness of the physiological systems of an organism and consequently plays a leading role in the regulation of the functional states of the organism. Worthy of ~~attention~~ are cases of increased selectiveness in the work on non-specific nervous formations from the lower brain sections to the medio-basal sections of the cortex (14). This includes the well-known data regarding tonic and phasal changes in the levels of activation. The former is related to a slow, involuntary fluctuation in stimulation in the course of, for example, a daily cycle or a performance that is of long duration. The latter, which arise rapidly and are less stable and less easily controlled by the subject, are reactions to changes in situations. The localization of such dynamics within the functions of various brain structures serves as the neurophysiological basis for discerning various patterns of activation, thus establishing the uniqueness of the actual state of the individual (2, 13).

However, as the experimental data accumulates, a whole series of problems arise in relation to the development of the basic principles of the activation theory. First this is based on the difficulty of precisely defining the term "activation" itself. Although traditionally it was thought that changes in the activation levels were caused by the sympathetic nervous system there is more and more proof of the existence of states in which there are simultaneous signs of the action of both sympathetic and parasympathetic activation (10, 20). For this reason some authors classify up to three and more various general activation states (2, 17).

Another serious problem is finding adequate psychophysiological correlations for various activation levels. The basis for the activation theory is the hypothesis concerning the existence of precise correspondence between the nature of the electrical activity of the brain (electroencephalographic indicators) and the level of wakefulness. For the greatest gradations on the wakefulness scale of "sleep-passive wakefulness-active wakefulness" the dependence is determined by the increase

in frequency and decrease in amplitude of the EEG curve as activation increases. However, in studying more limited segments of this continuum such an idealized scheme loses its clarity. A theoretical interpretation is needed for the presence in the EEG of a sleeping person of a period that is practically indistinguishable from the phases of active wakefulness (REM stages) as well as for the difficulty in isolating and differentiating various EEG patterns for the most varied states of active wakefulness (9, 14). The problem is complicated by the data on the activation levels achieved with the aid of various physiological procedures (2).

Moreover, difficulties arise in determining the nature of the relationships between activation levels, wakefulness and performance efficiency. The traditional concept of the existence of an inverted U-relationship among them has been subject to experimental criticism. Some works merely mention this relationship, but the rather extensive overview of R. Naatanen (19) presents quite a number of arguments in favor of the hypothesis regarding the steady relationship between the effectiveness of performance and the degree of activation within a class of tasks of a certain difficulty.

A traditional research area of functional states has been that of studying the dynamics of work capability and fatigue. However, despite the rich experimental material and the multitude of theories presented in the course of the 100 years that this problem has been studied, there has been no success in developing a generally-accepted theory of fatigue or dependable methods for diagnosing it.

It is difficult to give only one definition to the term "fatigue" (thus, one of the classic monographs (14) defines it in about 100 different ways). Naturally, all of the interpretations of the term are grouped around several basic approaches to the study of the established problem. In terms of application, the most important is an analysis of specific changes in an individual's work capability resulting from the development of a state of fatigue. For this reason most frequently, and on the whole justifiably, fatigue is seen as a temporary decrease in work capability resulting from the long-term effects of stress. Here the specifics of fatigue depend on the type of stress and the time necessary for reestablishing the initial level of work capability. This understanding of fatigue serves as the basis for the most general classifications within a given type of functional state--there are basic differences between physical and mental fatigue, between acute and chronic fatigue.

In this case the emphasis is placed on decreasing work capability. Nevertheless, in addition to existing difficulties which arise from establishing this definition (5), researchers are faced with the task of determining the specific features of the fatigue state in a number of other conditions that are related to the dynamics of work capability using similar methods (1). Thus, we establish three related but not identical conditions that lead to a decrease in the effectiveness of work performance--fatigue, monotony and psychological supersaturation. If the fatigue state can be characterized as a natural (related to increasing stress) reaction first to the duration of the task and the type of stress, then the other two conditions are the results of performing an unvarying task under specific conditions (paucity of the environment, limited field of work, simplicity and stereotypic movements, etc.). The general external effects of all of these conditions on work performance--a drop in efficiency--still do not

demonstrate proof of their identicalness. Differences are found in the behavioral plane as well as in the subjective concept of these conditions: characteristic of reactions to monotony are submersion into a somnolent state, the "cut-off" of the individual from the process of activity; typical reactions to the condition of psychological supersaturation are an affected emotional background for activities and a contribution of variety to the primary stereotype of tasks being performed; the development of fatigue is accompanied by an increase in specific errors due to inattentiveness, by a drop in precision and performance speed and by the appearance of symptoms reflecting the depletion of the organism's reserves. The differences between these states becomes clearer if we analyze their changes on a physiological and psychological level. A condition of monotony is characterized by a gradual drop in activeness but a condition of fatigue is characterized by an increase in stress in the performance of various systems, by a generalization of stimulation (including compensatory mechanisms in work), and by a growth in the correspondence of individual indicators (1, 8). This type of differentiation between the state of fatigue and other states that are externally similar to it attests to the necessity to concretize definitions with the aid of an analysis of qualitative changes in the level of work capability and of the complex of factors from which these dynamics arise.

The development of fatigue is related firstly to a drop in the performance effectiveness of those systems which are directly involved in the process of completing the task. As we have noted above, the type of stress affects the type of fatigue--physical and mental. Whereas for the former characteristic changes occur in the sensory-motor sphere and in related subjective perceptions as well as in energy loss, the latter includes symptoms of psychic disorganization, and primarily changes in the course of cognitive processes (perception, memory, attention, thought). As fatigue increases there is a generalization of displacements, which is demonstrated in the increased variety and expression of symptoms (6, 8, 12).

Thus, fatigue can be defined as a complex individual-cognitive syndrome (15), that develops when an individual performs the same task for a long period of time. It is possible to isolate several phases or different degrees in the development of this condition.

The traditional means of isolating these phases involves an analysis of a so-called "work capability curve"--the relationship between the effectiveness of performance and the time the task is done. In contrast to the early attempts to describe the dynamics of work capability only on the basis of indicators of labor productivity (quantity of products produced, defects, number of "misfires" in work, changes in work pace depending upon the length of the work day), modern research sees it from the point of view of the adaptive potential of an organism and of individual motivational factors (5, 12). At the present time there are several methods of analyzing a "work capability curve," on the basis of which we can isolate various dynamic phases. Here it is easy to establish the most typical stages: when work begins there is a period of working in, followed by a stage of optimal work performance (stable and unstable compensation), fatigue and the "final breakdown." In analyzing specific forms of a "work capability curve" not all stages are always observed. Depending on the type of job, the individual characteristics of the worker, the degree of his professional training and other factors the duration and intensity of specific stages can change radically or even disappear altogether.

If as the basis for isolating stages of work capability we take the characteristics of changes in the functioning of basic psychophysiological systems of the individual which determine the effectiveness of his performance, then it is possible to observe the dynamics of work capability at a closer level. Thus, during the period of working in we can separate the phases of mobilization, primary reaction and hyper-compensation; during the period of optimal work performance we have a corresponding phase of stable compensation; during the fatigue period we have the phases of sub-compensation, decompensation and breakdown (8).

Thus, only some of the stages of a "work capability curve" correspond to the fatigue state. We can speak about the beginning of its development starting with the moment that compensatory mechanisms are introduced into performance, that is from the time there is a reconstruction of the optimal methods of fulfilling tasks as a result of excluding some functions and including supplementary functions. The first external symptoms of fatigue attest to the insufficiency of compensatory resources to support performance effectiveness at the prescribed level (according to qualitative or quantitative indicators).

In many modern studies fatigue is examined as a generalized reaction of the individual to a stressful situation (16, 20). A more consistent similar point of view is expressed in the work of C. Cameron (16), who emphasizes that fatigue can be examined as a short-term or long-term condition. For qualitatively-different forms of fatigue (acute and chronic) various aspects of symptoms are the determining factors. In order to deal with a whole series of applied tasks (increasing labor productivity, prevention of disease, decreasing the accident rate in production, professional selection, etc.) it is very important to study the effects of accumulative fatigue and its transition to a chronic form close to disease. The first symptoms of the development of chronic fatigue are various subjective perceptions (ceaseless tiredness, rapid tiring, increased sleepiness, apathy, etc.). This direction in research requires putting a different accent on the traditional problematics of studying fatigue and finding new methods of research.

We cannot deal with the question of classifying and defining various forms of functional states without turning to the problems of studying stress (9, 10, 20). However, the blurriness of the term "stress" does not permit us to conduct a comparative analysis of these concepts. At the same time experimental and applied research devoted to studying various forms of stress has accumulated extensive and interesting material relative to specific conditions that develop under the influence of experimental factors.

Without stopping to examine specific data in detail, let us single out the primary moments in stress research, those that are of fundamental importance to the study of functional conditions.

First of all, this definition of stress as an unspecific generalized reaction of the body--"the general adaptation syndrome"--as an answer to the experimental effects of the environment (20). This definition of stress is important first for describing the psychophysiological mechanisms in the dynamics of conditions and presupposes the study of the entire picture of changes in the functioning of the organism. For specialists working in different areas the important thing is not so much a knowledge of specific neurohumoral mechanisms triggered to create such a reaction

(although the importance of this research direction cannot be doubted), as a study of the basic laws of stress genesis and realization. Thus, for example, in analyzing the effects of consequences of various unfavorable factors and the development of undesirable chronic conditions it is important to know the basic stages of development of the general adaptation syndrome in the form in which in they are proposed by H. Selye (20): the initial stage of "alarm" following extreme effects and expressed in the sharp drop in the body's resistive capacity; the stages of "resistance" which are characterized by the actualization of adaptation potential and by not only the restoration of the initial but also by a considerable growth in the level of resistance; and the stages of "exhaustion" which attest to the drop in reserve body strength and which are expressed in the steady drop of the resistance level. It is important to note that the duration of individual stages can change considerably depending on many factors--from several minutes from the beginning of the unfavorable stimuli to several months or even years. The latter belongs to the stages of "resistance" and "exhaustion" (16, 18).

Secondly, stress characteristics are very important from the point of view of which extreme factors (stressors) will initiate this condition. Extreme factors mean "limiting, extreme values of those elements in a situation which in their average values would create an optimal work background or which at least would not be perceived as sources of discomfort" (11).

The list of stressors is extremely varied ranging from simple physical characteristics of the situation (temperature, pressure, noise, the physical-chemical composition of the air, etc.) to complex psychological and social factors that cannot always be quantified (18, 20). In order to solve an entire series of engineering-psychological problems it is very important to know what the specific reactions of an individual are to specific frequent stimuli (for example, the specifics of noise, temperature, vibration stress, etc.). However, the main difficulty for the researcher consists of the fact that in real situations an individual's condition depends upon an entire series of related as well as unrelated stimuli. In other words in many cases it would be more appropriate to speak of combined types of stressors. If we consider the qualitative lack of uniformity of simultaneously-acting stimuli, the difficulty of describing the nature of the individual's reaction to each stimulus, the specifics of their interaction, then the complexity of the problem becomes apparent.

Thirdly, it is the priority goal of researchers to make a thorough analysis of various stress reactions and to develop their typology rather than their classification. The basis for isolating various forms of stress involves not only the special characteristics of the factors that induce stress,¹ but the nature of their effect on the individual and the elements of the response as well. The most general classification of stress has been proposed by R. Lazarus (7), who divides stress into physiological and psychological forms. These types of reactions are basically different because physiological stress involves the direct response of the body to the action of an unfavorable agent, whereas psychological stress presupposes

¹This is possible in part only in some of the most simple cases as mentioned above, in cases where stress is induced by one fixed parameter of external stimulation.

the inclusion of a complex hierarchy of mental processes which mediate the effects of stress.

Within the context of studying psychological stress attempts were made more than once to classify emotional conditions. Worthy of special attention are the works which demonstrate the origin of changes in the performance effectiveness of the subject in experimental situations depending on his attitude toward performance and his individual characteristics (4, 10, 13). The rich experimental material is interpreted by different authors with the aid of theoretical concepts and ideas that do not always correspond to each other. Most frequently variations of the terms "stress" are used--"tension," "psychic stress," "emotional stress," etc.--but varying definitions are attributed to the terms. We should remember the tradition existing in engineering psychology to characterize with the term "stress" a special class of functional states which is related to the information structure of the load and the regimen of presenting information (8). In the latter case the definition of "stress" is much broader than in the context of stress research.

Nevertheless, despite the extensive variance in definitions, there is an entire series of experimentally-derived concepts which describe the nature of an individual's behavior and his psychological mechanisms in experimental situations. Of great interest in this regard is the concept of mental stress developed by N. I. Nayenko (10). In isolating the states of "operational stress" and "emotional stress" it becomes possible to find criteria for the psychological differentiation of various states arising from externally identical situations.

Thus, research on various planes in the area of stress contains valuable information regarding the special characteristics of developing and progressing adaptation reactions of various degrees of complexity, including emotional state, the nature of the reflection of these reactions in the mental life of the individual and the reasons for the specific reactions. The use of these data in applied science concerning work performance in man will enable us to extensively broaden the studied spectrum of functional states in the working individual arising from real production conditions.

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CURRENT PROBLEMS IN PHYSIOLOGY OF LABOR IN CHEMICAL INDUSTRY

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 3, Mar 81
(manuscript received 30 Jul 80) pp 5-9

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[Abstract] Three directions of labor physiology activity in the chemical industry are formulated that include the physiological-hygienic, in the physical labor of fitters and repair workers, packers, shapers and, partially, equipment operators; the psychophysiological, with respect to occupational analysis of operator work, study of adaptation to specific conditions and development of methods for increasing labor reliability; and the toxicological-hygienic, which includes the participation of labor physiologists along with hygienists, occupational pathologists and toxicological specialists. Several characteristics common to all production processes in the chemical industry determine specific features of work by instrument controllers and operators. Problems of work had to do with the psychophysiology of the state of waiting, monotony caused by sensory deprivation, acquisition of skills in operation of automatic control systems, adaptation in a setting of motivational conflicts and development of work and rest conditions. References 15: 12 Russian, 3 Western.
[263-6521]

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AGE CHARACTERISTICS OF SYNTHESIZING TIME RELATIONSHIPS INTO A SYSTEM DURING SOLUTION OF FORMAL-LOGIC PROBLEMS BY SCHOOL CHILDREN

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VORONIN, L. G. and INOZEMTSEV, A. M., Chair of Physiology of Higher Nervous Activity, Moscow State University imeni M. V. Lomonosov

[Abstract] Data in this experiment were obtained when investigating solution of a problem, by students of grades 1 to 10, in which the time relationships formed at sequential moments of time must be synthesized into a unified system. The experimental installation consisted of a control console with buttons identified in order with symbols from 1 to 14 and a panel with signal lamps. The school children initially solved the problem by establishing the relationship between the lamp and pressing the button directly in front of it. The conditional relationship between the final button and the lamp indicated induced inhibition toward the conditional relationship between the other final button and the lamp formed during the preceding moment and also toward the abstract-logic relationship previously formed on the basis of instructions. The induced inhibition was stronger in younger school children than in older ones. A long time is required for individual time relationships to be formed among younger school children, indicating a system of cause-effect relationships in the experimental environment. Figures 1; references 8 (Russian).
[298-6521]

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